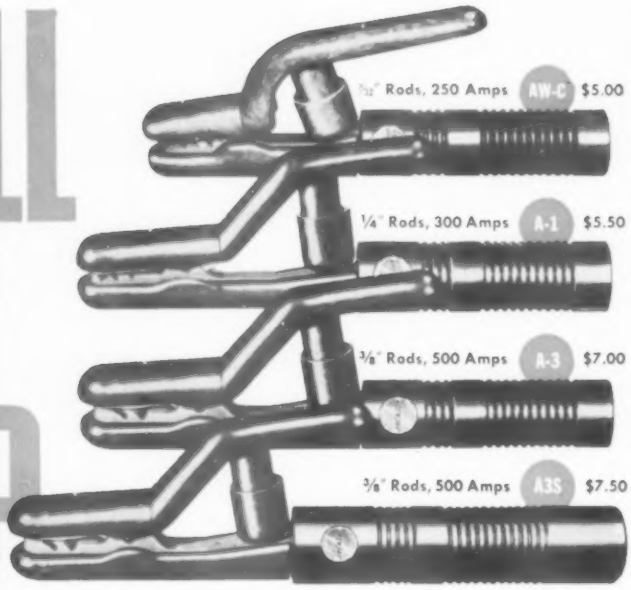
NOVEMBER, 1954

Industry & Welding

Flame cutting shapes girder ends for new Canadian building. Total value of Canadian construction in 1950 was close to $3 billion, more than seven times that of 1939.

STILL ON TOP



Jackson holders have long been in the lead, not only in the number of electrode holders sold, but on the basis of *quality*. Those shown here are made of a superior, 98% copper alloy, heat treated for greater strength, hardness and conductivity.

Independent laboratory tests show the following comparison between these Jackson Electrode Holders and two competitive makes, also made of copper alloy.

	Tensile Strength lbs. per sq. inch	Elongation	Hardness Rockwell 'B'	Electrical Conductivity
JACKSON	70,000	2%	70	35%
Make "B"	25-30,000	10-20%	6-7	25-30%
Make "C"	25-30,000	10-20%	10	16%

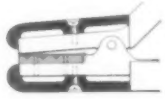
The Jacksons won on all points: *higher tensile strength*, to take almost any abuse; *lower elongation*, to hold their shape; *greater hardness*, to take the wear and tear between the jaws; *more conductivity* to take the current with a minimum loss.

All this, plus *thorough insulation*, improved time and again for greater strength, and *lowest-cost replaceable* parts, quickly installed to insure long life, make these Jackson holders the best buy for rugged, economical performance.

EXTRA

For even longer economical performance, Jackson offers holders similar to models A-1, A-3, and A-3S, shown above, with the added feature of replaceable lower jaws.

Model AA-1.....$ 6.50
Model AA-3.....$ 8.00
Model AA-3S.....$ 8.50



All Prices Lower in Quantity

Your Jackson Dealer will be glad to show you these and many other Jackson Electrode Holders. Also ask for the improved Ground Clamps and the latest in Jackson Welding Helmets and Safety Hats.

JACKSON
PRODUCTS, INC.
WARREN · MICHIGAN

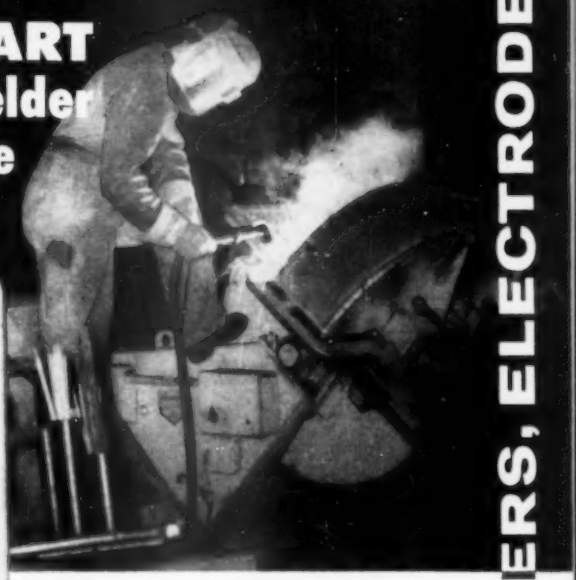
WORLD'S LARGEST MANUFACTURER OF ELECTRODE HOLDERS

Circle No. 1 on Reader Service Card.

Circle No. 2 on Reader Service Card. →

In addition to the Hobart Line of rotating Type Arc Welders, powered by electric motors and gasoline engines,

This New HOBART Transformer Welder is now available



It embodies Hobart's new "saturable leakage path" design (patent applied for) that assures you higher quality welding, lower welding costs, and improved weld quality.

A few of the outstanding features are "Pre-Surge" Inherent Arc Striking, Continuous Current Control, Double Overload Protection, Dual Control, Remote Control, Shrouded Fan Super Cooling, and many others.

Your Hobart Distributor will be glad to show you the advantages of this new AC welder. Hobart products are sold and serviced by leading welding supply houses in all principal cities. If you cannot locate the name nearest you, let us know and we'll promptly supply the name and address.

HOBART TROY OHIO WELDERS

HOBART BROTHERS CO., Box HW-114. Troy, Ohio

Phone 21223 "One of the world's largest builders of arc welders and welding equipment"

Here's a great rod for A.C. work.

Rocket 24

Ask your dealer!

Here's an electrode that has greater strength, speed, smoothness and more maneuverability. It's a mild steel general purpose rod for DC or AC welding. The Rocket 24 is a contact type electrode, heavily coated, employing iron powder in the coating which becomes an additional source of metal for the weld. It forms a flat, finely rippled bead with a minimum of undercut. Check coupon for complete details on this revolutionary new electrode.

HOBART BROTHERS CO., Box HW-114, Troy, Ohio, U. S. A.

Send information, without obligation, on the items checked below.

☐ AC Transformer Welder ☐ Rocket No. 24 Electrodes

☐ Name of distributor nearest me ☐ Other

NAME _____ FIRM _____

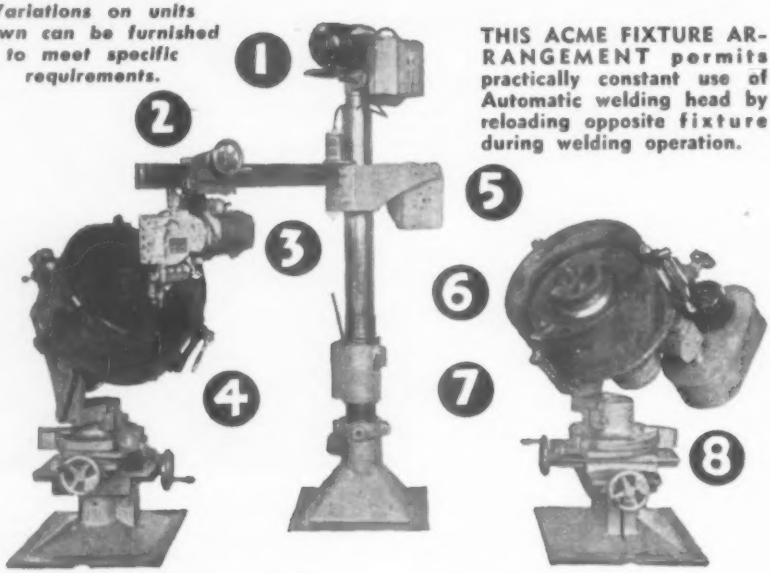
ADDRESS _____

CITY _____ STATE _____

HOBART WELDERS, ELECTRODES

ACME *Automatic* WELDING POSITIONER and FIXTURES

Variations on units shown can be furnished to meet specific requirements.



THIS ACME FIXTURE ARRANGEMENT permits practically constant use of Automatic welding head by reloading opposite fixture during welding operation.

1. Vertical power traverse with up and down inching button.
2. Hand wheel on carriage with locking arrangement for setting automatic welding head in proper relation to work.
3. Positioner arm swings and can be locked in proper position to either fixture.
4. 22" diameter wheel shown on fixture.
5. Fixture equipped with Reeves variable speed for proper feet per minute with reversing control. Fixture with two set speeds can also be furnished.
6. Holding machine can be set in either vertical or horizontal position. Shown in 45° angle.
7. Cross slide adjustment for fine setting so welding head on arm can be placed at either fixture without further adjustment.
8. Heavy copper brushes and holders mounted directly back of fixture for ground.

SPECIAL MACHINERY — AUTOMATIC BUFFING MACHINES

ACME *Manufacturing Co.*

1400 E. 9 MILE RD., DETROIT 20 (Ferndale) MICH.

Builders OF AUTOMATIC POLISHING AND BUFFING MACHINES FOR NEARLY HALF A CENTURY

Circle No. 3 on Reader Service Card.

GET THE FACTS on WELDIT SUPERIORITY!

WELD IT WITH WELDIT EQUIPMENT SUPPLIES

- 36 years experience in manufacturing fine welding equipment.
- Modern designing by top-flight welding engineers.
- Constant laboratory and production tests assure high efficiency and low operating costs.

- Thousands of users, throughout the world have, for years, used Weldit torches for every welding requirement.
- Originators of the famous Weldit Weldimatic torch and the Weldit Gasaver.

HISTORY OF WELDING

Roman artificers working at a primitive anvil, welding a sword handle to a blade by the Fusion Method of welding. The early Romans were gifted in this art several centuries before Christ.

WELDIT BLOWPIPE

NO. C-47

The new Weldit Weldimatic Blowpipe fabricated of special aluminum alloy, combines advantages that appeal to every welder.

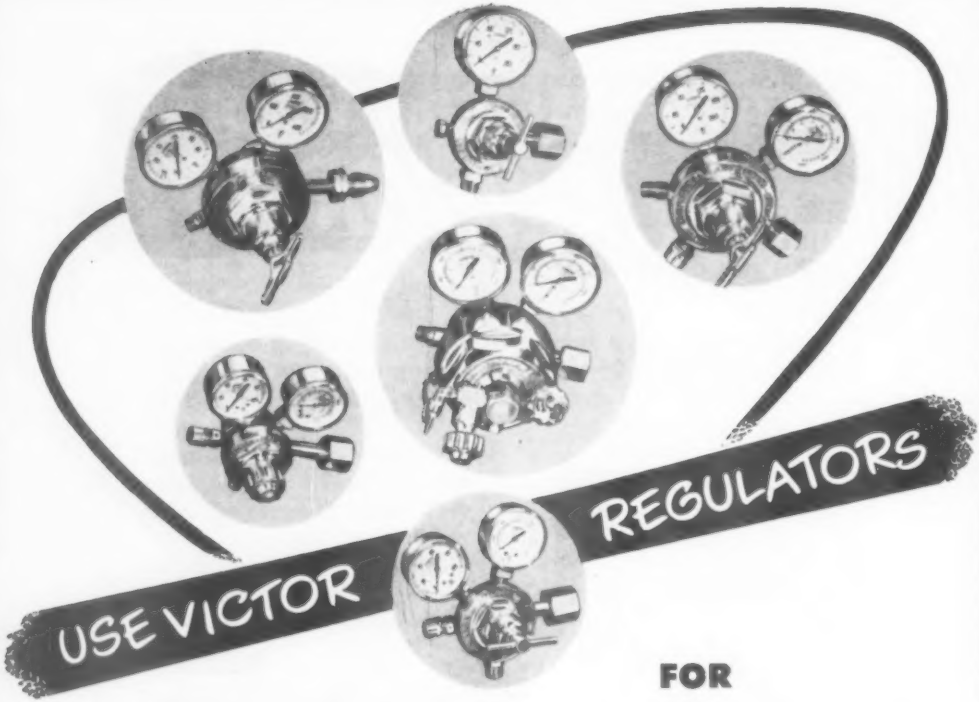
The C-47-W features light weight, less operator fatigue, increased capacity, more economy. The pilot automatically relights blowpipe when lever is pressed. Built to close engineering standards, plungers are of stainless steel, special design provides constant tension on pilot adjustment. Write for descriptive folder.

Canadian Distributor:—
ALLOY METAL SALES, 181 Fleet St., E., Toronto 5, Ontario, Canada

Weldit INC. SINCE 1918

990 OAKMAN BLVD.
DETROIT 38, MICHIGAN

Circle No. 4 on Reader Service Card.

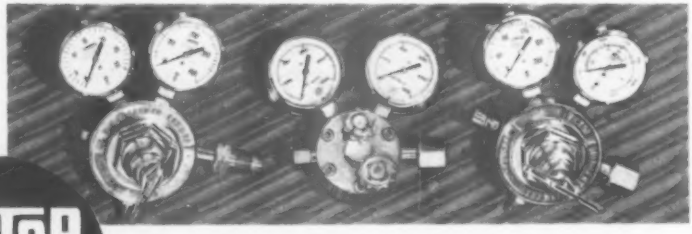


FOR

ACCURATE CONTROL AND MAXIMUM SAFETY

Accurate, long-wearing *Victor* Safety Regulators are available for almost every use and gas, for delivery pressures up to 5,000 p. s. i., and flows to 50,000 c. f. h. Simplicity of design makes for ease of maintenance at low cost.

Look for the VICTOR dealer sign . . . ask him to show you how it pays to standardize on VICTOR welding and cutting apparatus.



VICTOR for welding

Dealer Inquiries Invited

VICTOR EQUIPMENT COMPANY

3821 Santa Fe Ave. LOS ANGELES 58 — 844 Folsom Street SAN FRANCISCO 7 — 1312 W. Lake St. CHICAGO 7

4

Circle No. 10 on Reader Service Card.

Industry & Welding

NOVEMBER, 1954
VOL. 27 No. 11

Irving B. Hexter
President

Lester P. Aurbach
Exec. Vice-Pres.

Edwin M. Joseph
Vice-President

LEW GILBERT
Executive Editor

Associate Editor:
Charles P. Berka
Robert Joseph

Harold F. Behm
Franchise Mgr.

SALES OFFICES

CLEVELAND
F. P. Mignin, Jr., Mgr.
Robert O. Simmons
1240 Ontario St.
Cleveland 13, Ohio
SUperior 1-9622

NEW YORK
Lee Haas, Mgr.
Arthur Joyce
Room 803
60 East 42nd St.
New York 17, N. Y.
Murray Hill 7-3420

CHICAGO
L. Willoughby, Mgr.
S. R. Tracy
Suite 1613-1615
520 N. Michigan
Chicago 11, Ill.
WHitehall 3-1655

LOS ANGELES
Alan Cazier, Mgr.
Room 1003
3460 Wilshire Blvd.
Los Angeles 5, Calif.
DUnkirk 9-9364

LONDON, ENGLAND
John Lancaster
5 New Bridge Street
Fleet Street
London E.C. 4, Eng.
Telephone: City 4815

Address all communications to Cleveland office.

BPA

Subscription
$2.00 per year
$3.50 for 2 years.
Foreign subscriptions $4.00 per year, except United Kingdom. United Kingdom subscriptions £ 1.10 per year, payable in Sterling to our London office.

IN THIS ISSUE

FEATURES

Facts on Welding Titanium 36
Submerged Arc Process Increases Welding Speeds at Caterpillar 41
Oxy-Acetylene Welding of Copper 47
Welding Reduces Weight of Navy Gun Housing by 70 Percent 53
Inert Arc Welding With Coated Wire Speeds Fabrication of Mild Steel 58
21 Ways to Lower Cost of Arc Welding for Production 69
Use Atomic Hydrogen Welding To Repair Alloy Steel Tools and Dies 76
INDUSTRY & WELDING Attends A Welding Clinic 83
Rotating Jigs Make It Easy To Surface Cylindrical Objects 85
More About Welding Codes 94

DEPARTMENTS

Valuable Literature Available 12
Literature Featured in Ads This Month 22
Advertisers Equipment Index 30
New Welding Products 86
News of the Welding Industry 98
Advertisers In This Issue 112

Copyright 1954 by THE INDUSTRIAL PUBLISHING GROUP
(A Division of Telenews Productions, Inc.)

Published monthly by The Industrial Publishing Group, Cleveland, Ohio. Acceptance under section 34.66, P. L. and R., authorized at Fostoria, Ohio. Member Business Publications Audit of Circulation, Inc.
Magazines Affiliated with The Industrial Publishing Group:
FLOW • PRECISION METAL MOLDING • OCCUPATIONAL HAZARDS
APPLIED HYDRAULICS • COMMERCIAL REFRIGERATION AND AIR CONDITIONING

Industry and Welding is indexed regularly by Engineering Index, inc.

in repair welding . . .
in production welding . . .

only **bronze** offers all of these advantages

TITAN Bronze Welding Rods are supplied in several types to meet every requirement for oxy-acetylene welding. All are carefully deoxidized to assure ductile, high-strength, non-porous welds. Our general purpose rods are Double-Deoxidized by a potented process.

can be applied to a wide range of materials

Mild Steel • High and Low Carbon Steel • Cast Steel • Wrought Iron • Brass • Bronze • Copper • Grey Iron • Malleable Iron Castings.

Chrome and Nickel Cast Irons and many others

easily and quickly applied

Uniform and Easy Tinning.
Pre-heating or post-heating for stress relief are not necessary.
Low melting point.
Pre-cleaning can be eliminated with certain types of rods.
Bronze welds are easily machined.

bronze welds are dependable in service

Superior bonding properties • High strength
Excellent wear resistance • Corrosion resistant

Write for Complete Information

Quality Alloys by Brass Specialists

BRASS and BRONZE ROD • FORGINGS • DIE CASTINGS • WELDING RODS • WIRE

Titan® METAL MANUFACTURING CO.

Offices and Agencies in Principal Cities

General Offices and Plants: Bellefonte, Pa.
ROD MILL DEPOTS: Bellefonte, Pa., Indianapolis, Ind.

Circle No. 6 on Reader Service Card.

TUNGSTEN ELECTRODES MAY *LOOK* ALIKE

But Have You Tried THESE NEW ONES by ELMET

Even if you judge tungsten electrodes by *appearance* alone, you'll like the new ELMET Efficiency Electrodes.

When you judge by *performance*, you'll find that ELMET Electrodes stand in a class by themselves. Their uniformity of properties, dimensions and characteristics prevent loss of time due to readjustments of equipment and voltage.

Furnished in cleaned finish and centerless ground finish. Available in packages of 10 in all standard diameters from .040" to ¼" and from 3" to 18" in length. North American Philips Company, Inc., Elmet Division, Lewiston, Maine.

Try New ELMET Electrodes Now! Use Coupon Below

Free Folder

Don't delay! Do it today! Send the coupon and get the facts about ELMET Efficiency Electrodes.

Distributor Inquiries Invited

NORTH AMERICAN PHILIPS CO., INC., Date_____
Box 1041D, Lewiston, Maine.
Please send me ☐ Free Folder and

☐ *Price on* _____ *Elmet Electrodes.*
(quantity, size, finish)

Name_____

Street_____

City_____ **State**_____

☐ *Send me your distributor proposal.*

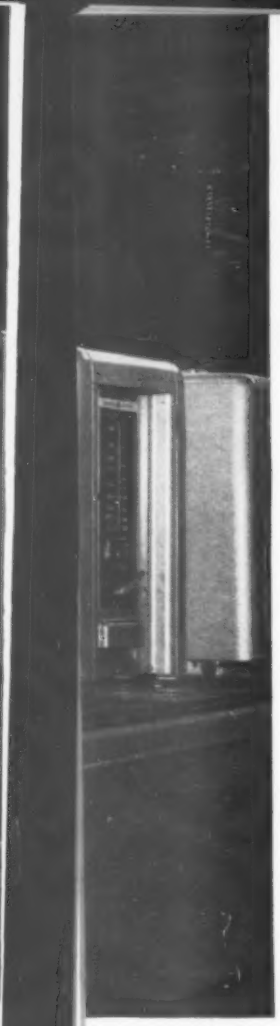
Circle No. 5 on Reader Service Card.

WELDING ARCS NEWS

LONG-LIFE WELDERS ASSURED BY MODERN TESTING AT NEW G-E PLANT

NEW G-E WELDING PLANT provides modern facilities for new standards in welding equipment.

PERFORMANCE TESTING backs up new design and materials for a-c welders.



G.E. announces a NEW line of long-life a-c transformer welders

new design and materials backed up by exacting quality controls, including 20 life-tests, 21 inspections

General Electric now brings you a new line of a-c transformer welders, available in 300-, 400-, and 500-amp models. This modern equipment features new design and materials for increased life-span—backed up by extensive quality control, and testing.

MOVING-COIL DESIGN reduces wear and vibration normal to other types of welder design. Together with G.E.'s logarithmic scale, moving-coil design assures pinpoint accuracy in current settings.

IMPROVED AUTOMATIC "HOT START" gives you instant arc striking—*throughout the current range.*

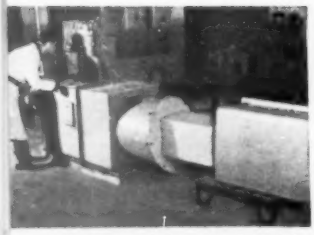
MORE PROTECTION against overheating damage caused by short-time overloads is provided by silicone insulation on all coils. Silicone, by test, withstands temperatures which disintegrate ordinary varnishes.

EVEN QUIETER OPERATION than normal for a-c welders is achieved by a special vibration-insulating mount for coil supports.

ADDITIONAL G-E FEATURES include idlematic control; arc-stabilizing capacitors; open construction and removable side covers for easy servicing.

Ask your G-E welding distributor today for bulletin GEA-6243. His name is listed in the yellow pages of your phone book. General Electric Co., Schenectady, N. Y.

710-20E



PROPER COOLING of welders, for dependable service, is checked in air-flow test.

SIX TIMES RATED VOLTAGE is applied to coil to test performance under overloading.

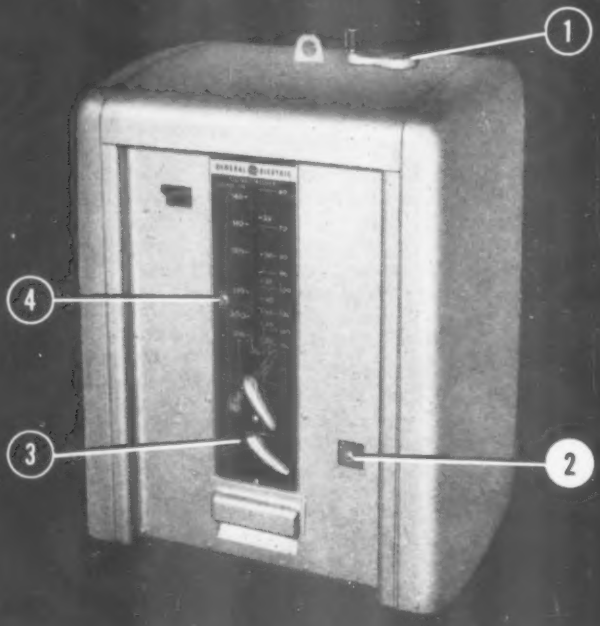
	General Electric	Company A	Company B	Company C
Moving Coil Design	✓			✓
Aluminum Windings	✓	✓		
Silicone Insulation	✓			
Hot Start	✓	✓	✓	
Arc-Stabilizing Capacitors	✓	✓		
Large Logarithmic Current Scale	✓			✓

COMPARISON shows the new G-E a-c welder is your best buy. Turn page.

GENERAL ELECTRIC

Circle No. 8 on Reader Service Card.

NEW G-E 300-amp rectifier welder offers full-time arc-force control



. . . and many improved features, including:

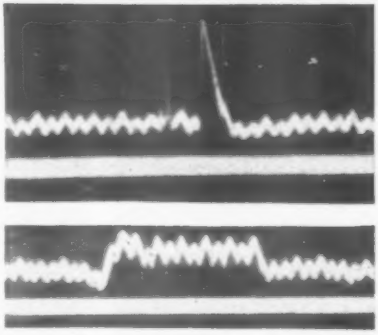
1 **FINGERTIP-ADJUSTABLE MOVING COIL:** provides stepless current control for pinpoint accuracy, reduced wear and vibration. Wide current range is 20-375 amps.

2 **ARC-FORCE CONTROL IS FULL TIME:** does not cut out in the middle of an electrode. High arc force blasts away short-circuiting metal drops, which often freeze short arcs. Results—unusual arc stability, deep penetration.

3 **REVERSING POLARITY SWITCH:** conveniently mounted for instant changing from straight to reverse polarity.

4 **SPRING-LOADED CLEANOUT SWITCH** reverses ventilating fan for blowing dust off rectifiers—prolongs equipment life.

Write your G-E welding distributor for bulletin GEA-6242. His name is listed in the yellow pages of your phone book.

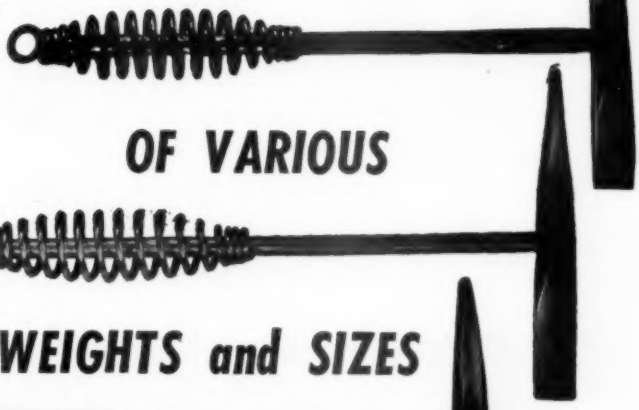


WITHOUT ARC-FORCE CONTROL, (lower graph), long short-circuit cools metal, freezes electrode. With G-E full-time arc-force control (above) short circuit is brief, metal is blasted away.

GENERAL ELECTRIC

Tough as they come

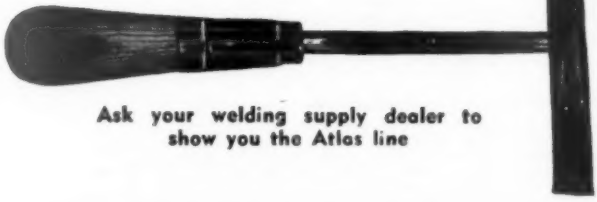
27 MODELS



OF VARIOUS

WEIGHTS and SIZES

IN TOP QUALITY

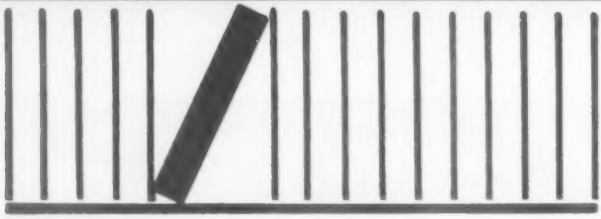


Ask your welding supply dealer to show you the Atlas line

Atlas WELDING ACCESSORIES CO.

707 E. LEWISTON AVENUE FERNDALE 20, (DETROIT) MICH.

Circle No. 24 on Reader Service Card.



useful free literature

The publications featured on these pages were written by experts. They are FREE to our readers. To obtain these helpful reference materials use the postcard bound into this issue.

A MULTI-PURPOSE FLUX for brazing and welding cast iron, steel, bronze, copper, brass and malleable iron is described in literature available from Northeast Metals Company. According to the company's brochure, the new flux can be used without surface cleaning, offering quicker tinning through a wide range of temperatures. **Circle No. 81.**

BRASS WIRE IS DESCRIBED IN DETAIL in a new 4-page folder published by Titan Metal Mfg. Co. The folder shows how Titan hot-extrudes, anneals and draws its wire and outlines which tempers are recommended for making rivets, bolts, nuts, fasteners, screws and other similar cold-headed parts. **Circle No. 100 on Reader Service Card.**

A TWENTY-FOUR PAGE BOOKLET of photographs and articles on arc welding in North America is published by Hobart Brothers Co. Among the features of Volume XI, No. 3, Hobart Arc Welding News are articles on automatic welding control problems and various cost-cutting applications. **Circle No. 101 on Reader Service Card.**

LEARN MORE ABOUT CYLINDER MANIFOLDS! Facts about the design, construction, and usefulness of cylinder manifolds is described in data sheets available from National Welding Equipment Co. The data sheets explain how to design an adequate cylinder manifold for various gases and whether to use one or two regulators. **Circle No. 102 on Reader Service Card.**

A NEW LINE OF CUTTING TORCHES developed by Smith Welding Equipment Corp. is featured in a new bulletin. This line is described as combining light weight with heavy cutting capacity. **Circle No. 103 on Reader Service Card.**

VALUABLE INFORMATION ON BENDING is described in an attractive brochure offered by Hossfeld Manufacturing Company. How to bend rounds, pipe, flats, tubing, squares, conduit and angle iron with the company's Universal Iron Bender is explained in detail. **Circle No. 62 on Reader Service Card.**

BRUSHES FOR WELD FINISHING ARE FEATURED in a handy pocket guide offered by The Osborn Manufacturing Company. Also described is a complete line of power brushes for every industrial application. **Circle No. 104 on Reader Service Card.**

EFFICIENT WELDING IS EASY by using the right arc welding accessories for the job according to Tweco Products Co. Bulletin F-40 contains listings and helpful applications. **Circle No. 105.**

An Entirely New Concept of Low Hydrogen Welding

ATOM•ARC

Combining the best in welding arc characteristics with the highest physical properties known to steel producers today . . . *ATOM* ● *ARC* electrodes meet the stern requirements of the Atomic Age.

Compare Atom • Arc with Ordinary Low Hydrogen Electrodes

Faster . . . For the first time in the industry, *ATOM* ● *ARC* utilizes iron powder in the electrode coating of a low hydrogen electrode—making possible the use of higher welding currents with either A.C. or D.C.

Greater Deposition Efficiency . . . Amazing deposition efficiencies are made possible because iron powder contained in the electrode coating serves as an additional source of weld metal.

No Moisture Pick Up . . . *ATOM* ● *ARC* is packed in 50-lb. hermetically sealed metal containers. Electrodes will effectively resist detrimental moisture pick up for ten days after opening container.

Weld Appearance . . . The full covering, easy to remove slag helps to form a smooth, uniform weld bead—free of undercut.

Ease of Welding . . . *ATOM* ● *ARC* reduces welder fatigue because the heavy electrode coating permits contact with the work in all positions.

Highest Physical Properties . . . *ATOM* ● *ARC* is manufactured in six A.W.S low hydrogen grades and will meet all specifications for these types of electrodes.

At the METAL SHOW . . . See ATOM • ARC demonstrated at the Alloy Rods Company Booth #1359 at the Metal Congress, Chicago, November 1 to 6. Call your Alloy Rods Company distributor or write to nearest plant for further information.

Alloy Rods Co.

ALLOY RODS COMPANY

NO FINER ELECTRODES MADE . . . ANYWHERE

General Offices & Plant
YORK • PENNSYLVANIA

Pacific Coast Division
EL SEGUNDO • CALIFORNIA

Circle No. 11 on Reader Service Card.

FAST, ACCURATE, FLAME CUTTING OF PIPE AND TUBING with hydraulic operated cutter is featured in a pamphlet put out by I. A. Woerner. Illustrated and printed in color, the pamphlet describes in detail various applications of the Woerner Tubular Profile Cutter. **Circle No. 106.**

HARDFACING COMPARISON CHART published by Mir-O-Col Alloy Co., Inc., lists and compares various rods and electrodes made by 29 different manufacturers. It is set up to provide quick and easy reference on hard-facing rods or electrodes. **Circle No. 107.**

GETTING MACHINABLE ARC WELDS in gray iron castings is no problem if you use the improved "600" electrode made by C. E. Phillips & Co. A pamphlet, offered by the company, contains information on basic welding procedures to be used with fabricated electrode made of nickel core wire enclosed in a sheath of thin copper strip. **Circle No. 108 on Reader Service Card.**

END AUTOMATIC WELDING CONTROL PROBLEMS with constant voltage welders is the headline of a report prepared by Glenn Company. Factual data sheets describing principle and application of constant voltage welder to inert arc, submerged arc and semi-automatic arc welding is given. **Circle No. 109 on Reader Service Card.**

COMPACT PNEUMATIC HAMMERS FOR WELD SCALE REMOVAL —"and a thousand and one jobs" are covered in literature offered by the Borm Mfg. Co. Recently designed hammers have special locking device eliminating the danger of chipping tools flying out while in operation. **Circle No. 110.**

"WE CUT REWORKS 94% *with DryRod Electrode Oven!"*

When 1 out of 3 welded hydraulic fittings were rejected at a leading Milwaukee machinery plant*, engineers blamed *moist electrodes.* Installing a low-cost DryRod Electrode Oven to store all unpackaged low-hydrogen rods, this company got *immediate* improvement . . . faster, better welds . . . few rejects. Their welding engineer said, *"DryRod successfully solved our welding porosity problem. With it we've been able to cut our reworks from 30 pieces to less than 2 per hundred!"*

Get your money's worth

You pay a premium for stainless steel, low-hydrogen, and other mineral-coated electrodes. Preserve that "baked-in" quality with DryRod Electrode Oven. Ask your welding supply dealer, or write direct for free folder.

*Name on request X-DR-10

DryRod DIVISION OF **Phoenix Products Co.** 4716 N. 27TH ST., MILWAUKEE 16, WIS.

Circle No. 12 on Reader Service Card.

AUTOMATIC
TORCHES

THE HEART OF ECONOMY

Approved by Underwriters' Laboratories

BY ACTUAL COMPARISON

USING NON-AUTOMATIC TORCH . . . . . 12 Pieces Welded
USING NON-AUTOMATIC WITH GAS SAVER . . 18 Pieces Welded
USING HARRIS AUTOMATIC TORCH . . . . 28 Pieces Welded

Using the same amount of Oxygen and Acetylene for each set-up, this "Actual Comparison" Demonstration proved the Harris Automatic Torch to be a profitable investment for economical and efficient welding work.

Let our local Distributor show you the "Actual Comparison" test in your plant and explain quickly and simply why the Harris Automatic has the greater piece production at the lowest cost.

ALMOST 50 YEARS OF "KNOW-HOW"

Harris is the originator of the "Automatic" Torch and with almost 50 years of building "Know-How" behind every torch, the buyers and users get tremendous returns on their torch investment.

Harris' long established Distributors, located in all principal cities in the United States and Foreign Countries, are at your service.

HOME OF AMERICA'S FIRST AND FINEST GAS WELDING AND CUTTING APPARATUS.

THE HARRIS CALORIFIC COMPANY
Cleveland 2, Ohio

HARRIS

SERVING THE METAL INDUSTRY SINCE 1905

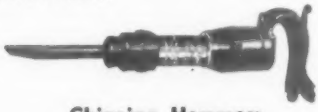
Circle No. 13 on Reader Service Card.

REMOVES WELD METAL FASTER

Master Power pneumatic tools jump production and increase efficiency.

MASTER POWER pneumatic tools are precision built for rugged duty and quiet operation—light-weight to provide easy handling and reduce operators fatigue—hard chrome finished for trouble free service and 2 to 3 times longer tool life.

Whatever your weld finishing problem a test trial on your job under your own working conditions will prove the superiority and economy of MASTER POWER tools.



Chipping Hammers

Horizontal Grinders

Write for literature available on all models and sizes.

MASTER PNEUMATIC TOOL COMPANY, INC.
Orwell, Ohio

Circle No. 14 on Reader Service Card.

PROTECTION OF PROTECTIVE EQUIPMENT AND GLOVES is subject of literature offered by John Tillman & Co. brochure which describes the use of polyethelyne bags. These packages keep the garments clean, protected from shelf wear and visible to potential customers.

Circle No. 111 on Reader Service Card.

ILLUSTRATED INDUSTRIAL PRODUCTS CATALOG is available from the American Brake Shoe Company. This 48-page, two-color catalog illustrates products produced by eleven divisions of the company giving breakdown by type of product. The catalog contains sections on welding products, ferrous and non-ferrous castings, bearing materials, sintered metals, and steel forgings.

Circle No. 112 on Reader Service Card.

HOW TO CHOOSE THE CORRECT GRINDING WHEEL available from the Norton Company. The 28-page catalog covers grinding wheel selection in detail, discussing abrasive types, bonding materials, wheel speeds, wheel markings, standard wheel shapes, mounted points, and abrasive polishing grain.

Circle No. 113 on Reader Service Card.

PORTABLE ARC WELDERS made by Royal Arc Industries are featured in specification sheet which gives operating data. Welders are described as ideal for maintenance and repair work in plants and garages.

Circle No. 114 on Reader Service Card.

PROPERTIES OF DUCTILE IRON is the subject of a 12-page bulletin. It discusses the influence of carbon, silicon and phosphorous contents and section size on the mechanical properties of Ductile Iron. The bulletin is available from The International Nickel Company, Inc.

Circle No. 115 on Reader Service Card.

ILLUSTRATED BROCHURE ON INDUSTRIAL ENGINES is offered by the Industrial Engine Department, Willys Motors, Inc. This brochure gives complete engine details on two Willys industrial engines. Included are dimension diagrams of both of these engines.

Circle No. 116 on Reader Service Card.

OXYGEN PLANTS made by Superior Air Products Co. are described in a catalog which gives information on various models. The literature includes diagrams of different types of oxygen plant systems.

Circle No. 117 on Reader Service Card.

THIS IS LOW COST WELDING!

When a touch on a button moves weldments like these into the correct, most convenient position for a downhand pass, you get more arc time, more welding at lower cost. C-F power operated Positioners rotate the work in a full circle at any point in a range of 135° from the horizontal—giving welders a choice of an infinite number of downhand welding positions instantly.

Every requirement for faster, better positioned welding—constant or variable speed table rotation, full 135° tilt, self-locking gearing which holds the table in any position, oversize built-in main tilt and rotating bearings, choice of two base styles, and many other features—are built into C-F Positioners.

C-F Positioners are available in Hand or Power operated models, and are made in capacities up to 30,000 lbs. and larger.

Write for the new C-F Positioner Catalog

CULLEN-FRIESTEDT CO.

1315 S. Kilbourn Avenue **Chicago 23, Illinois**

CULLEN-FRIESTEDT CO., CHICAGO 23, ILL.

C-F positioned welds mean better, more economical welds

Circle No. 15 on Reader Service Card.

RACO COSTS NO MORE ... SOMETIMES LESS gives you UNINTERRUPTED

MILD STEEL • MEDIUM CARBON • LOW ALLOY
ALUMINUM • BRONZE • SPECIAL PURPOSE ALLOYS
CHROME-MOLY • STAINLESS • NICKEL • TITANIUM

THREADWOUND COILS
WIRE ON SPOOLS • CATCHWEIGHT COILS

STRAIGHT LINE FEED OFF—Threadwound coils assure straight line feed off. Final reduction to finished size is made on rewinding machines. All butt welds are pulled through finishing die eliminating bumps, kinks and cross overs. All coils have a cast placed in them with a four-inch maximum expansion . . . coils stay in place when tie bands are cut, avoiding looping over sides of pay off reels.

STEEL BANDS STIFFEN COILS—Threadwound coils are now being wound on corrugated steel bands for added stiffness.

UNIFORM WEIGHT—Threadwound coils are of uniform weight, automatically controlled by our rewinding machines.

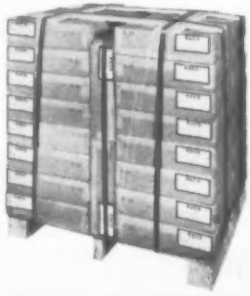
PALLETIZED CARDBOARD CARTONS—Threadwound coils are packaged in cardboard containers, then steel strapped on pallets manufactured in our own plant.

ENDS OF COILS—Back end of each coil is securely anchored to corrugated steel band . . . starting end is marked with colored tag and left straight for feeding automatic machines. No cutting or straightening needed.

ALL COPPER-COATED WIRE IS ELECTRO-PLATED

MODERN MANUFACTURING FACILITIES—We have complete and modern continuous wire drawing equipment, descaling and acid cleaning for hot-rolled wire rod. Annealing and normalizing equipment. We have fourteen wire straightening and cutting machines, and can furnish straightened and cut lengths up to 36", in sizes 1/2" to 5/16". Catchweight coils up to 400 lbs. Threadwound coils in all standard widths and I.D. . . . all standard size spools.

MANUAL ELECTRODES AND GAS RODS—Available in 50-pound cartons, shipped on pallets at no extra charge.

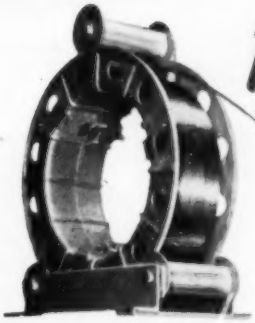


Circle No. 16 on Reader Service Card.

what it takes for
AUTOMATIC ARC-WELDING

RACO COMPOSITE TYPE "A"

Heavy Coated Open-Arc Electrode. Available in mild steel, low alloy-high tensile, low hydrogen, hard surfacing and stainless steel grades. Two other grades for open-arc welding—RACO TYPE "D" with white flux coating and RACO TYPE "M9" (knurled) with red flux.



plus

THE LATEST IN LABOR-SAVING EQUIPMENT

RACO **FREE WHEELING REELS—SAVE DOWN TIME** by using larger Raco coils. Ball-bearing trunnions enclose the coil so there is no overrun or loose strands and larger coils can be used. Changing coils is a matter of only a few seconds and no tools are required. Available in 12, 14, 25 and 36 inch sizes, for any weight from 50 to 200 pounds.

FOR SUBMERGED ARC-WELDING

The New RACO Model BW-2

Outstanding features are:

1. Adaptability to any job . . . nozzle can be positioned 360° in two planes.
2. Simplified control for either standard or constant potential welders, AC or DC.
3. Easy to install . . . just plug in head and hook up welding cables.
4. Available with various nozzles and attachments for submerged-arc, gas-shielded arc, or open-arc welding of all kinds. Also duplex nozzles and feed rolls for twin arc-welding.
5. Trouble-free operation . . . only three moving parts.

THE RACO TYPE 4R automatic head and controls are designed and furnished for use with RACO composite Type "A" wire.

WRITE FOR CATALOG AND DATA SHEETS

DISTRIBUTORS FROM COAST TO COAST

The REID-AVERY COMPANY Inc.

BALTIMORE 22, MARYLAND

SINCE 1919 PRODUCERS OF ARC-WELDING ELECTRODES AND WELDING RODS

Circle No. 16 on Reader Service Card.

INVINCIBLE
Flux Recovery Systems

Fully Automatic
Model 482.

Portable
Model 460.

Save VALUABLE FLUX—Invincibles recover all unfused flux from the work, remove fine dust and fused particles, return slag-free, dust-free, fusible flux to the hopper of the welder.

Eliminate COSTLY MAN-HOURS—Invincibles do the whole job, more rapidly and efficiently than manual methods.

Reduce EXPENSIVE REJECTS—By removing all fine dust (flux flour), Invincibles reduce welding rejects and step-up production.

Write for Folder on Invincible Flux Recovery Equipment.

INVINCIBLE VACUUM CLEANER MFG. CO.
DOVER, OHIO
OVER 50 YEARS THE LEADER IN INDUSTRIAL VACUUM EQUIPMENT

Circle No. 17 on Reader Service Card.

Manufacturers of High-Quality Electric Arc and Spot Welders Since 1929

In Honor of Our

25th ANNIVERSARY

We Proudly Present . . .

miller TA-250 SERIES Tungsten Arc Welders

WITH *Unitran*

MODEL	CURRENT RANGE (Amperes)	RATED OUTPUT (Amperes)	DUTY CYCLE
TA-251-P	5 to 250	150	100%
TA-252-P	10 to 400	235	100%
TA-253-P	15 to 600	350	100%

Write for complete facts on our 25th Anniversary TA-250 Series... you'll be glad you did!

Three *electrically* controlled A.C. models which combine the excellent welding characteristics of famous Miller 200 Series Welders with the unique features of Miller's patented UNITRAN control circuit. UNITRAN eliminates need for any mechanical type of current control, and, along with optimum open circuit voltage, high frequency oscillator and balancing resistor, UNITRAN insures superior *quality* and *flexibility* over the entire welding range. All models are power factor corrected, convert for use with shielded arc electrodes at the flick of a switch. Also available: A full line of running gear, self-contained coolant systems, hand and foot remote current controls, and gas-water controls.

miller

ELECTRIC MANUFACTURING COMPANY Inc. • Appleton, Wisconsin

Distributed in Canada by Canadian Liquid Air Company, Ltd., Montreal, P.Q.

Circle No. 18 on Reader Service Card.

Literature Featured In Ads This Month

(CIRCLE ON ENCLOSED POSTCARD, NUMBERS OF LITERATURE YOU WISH TO RECEIVE)

2 **Contact-type electrode** with iron powder coating is featured in data book. HOBART BROS. CO. Page 1.

3 **Automatic welding positioner** and fixtures are described and illustrated. ACME MFG. CO. Page 2.

4 **Lightweight blowpipe** and all its advantages are subject of descriptive folder. WELDIT, INC. Page 3.

6 **Bronze welding rods** for repair and production are catalogued in brochure. TITAN METAL MFG. CO. Page 6.

5 **Tungsten electrodes** for inert arc welding are featured in booklet. NORTH AMERICAN PHILIPS CO., INC. Page 7.

8 **A-C transformer welders** built for long life are introduced in Bulletin GEA-6243. GENERAL ELECTRIC CO. Pages 8-9.

9 **300-amp rectifier welder** with full-time arc-force control is described in Bulletin GEA-6242. GENERAL ELECTRIC CO. Page 10.

12 **Electrode stabilizing ovens** which keep low-hydrogen electrodes dry are featured in free folder. PHOENIX PRODUCTS CO. Page 14.

14 **Pneumatic power tools** for speedy removal of weld metal are included in free literature. MASTER PNEUMATIC TOOL CO. Page 16.

15 **Positioner catalog** explains efficiencies of C-F welding positioners. CULLEN-FRIESTEDT CO. Page 17.

17 **Flux recovery equipment** for use in submerged arc welding operations is described in free folder. INVINCIBLE VACUUM CLEANER MFG. CO. Page 20.

18 **Tungsten arc welders** just introduced in three electrically controlled A-C models are previewed in literature. MILLER ELECTRIC MFG. CO., INC. Page 21.

19 **All-purpose all-position electrode** for welding mild steel is introduced. NATIONAL CYLINDER GAS CO. Page 23.

21 **Everything for resistance welding,** including electrodes, wheels, holders, castings and forgings, are featured in new catalog. W W ALLOYS, INC. Page 25.

7 **Welding positioners** for high speed welding operations are featured. ARONSON MACHINE CO. Page 26.

23 **Welding helmets** for every operation are featured in literature and price lists. PENNSYLVANIA OPTICAL CO. Page 27.

22 **Resistance welding electrodes** are featured in descriptive literature. TIPALOY, INC. Page 28.

28 **Shape cutting machines that** assure close-tolerances are introduced. AIR REDUCTION SALES CO. Page 29.

32 **Electrode holders and ground clamps** and their features are described in free folder. WAGNER MFG. CO. Page 31.

27 **Stainless steel welding wire** is featured in catalog. DRAWALLOY CORP. Page 32.

25 **Resistance welding materials** for all uses are featured in catalog. P. R. MALLORY & CO., INC. Page 33.

Circle No. 19 on Reader Service Card. →

Now NCG® creates a truly all-purpose all-position electrode for welding mild steel

THE NEW NCG SUREWELD® "CE" ELECTRODE

NCG's new "CE" Electrode is designed to perform with maximum efficiency over a wider range of applications. It is usable in all positions with AC or DC straight or reverse polarity. Operators like this new rod because it is easy to strike and hold an arc, even with AC at low welding currents and low open-circuit voltages. There is little spatter; the arc is soft; action is quieter, with spray type metal transfer. Beads are smoother, with a fine, even ripple—free from pock-marks and slag inclusions. Slag deposits brush off easily. "CE" deposits with remarkable efficiency in any position. *Sureweld* "CE" conforms in all respects to E-6013 specifications. Your NCG dealer or nearest NCG office will be glad to demonstrate this new rod and let you try it for yourself. Contact him today.

Here are reports from the field:

"The best all-around AC rod I've ever used."

"We are getting very good results with CE. And we like the way the slag practically drops off when cool."

"Beads have exceptionally smooth surface."

"In our book it surpasses any other E-6013 on the market."

"We think it's superior to all other 6013 electrodes in running characteristics."

"We find we can use it on more jobs than any other electrode we've tried."

NATIONAL CYLINDER GAS COMPANY
840 North Michigan Avenue, Chicago 11, Illinois

Branches and Dealers from Coast to Coast

Copyright 1954, National Cylinder Gas Company

NCG®
EVERYTHING FOR WELDING

29 **Three new welding electrodes** that handle every job required of E-6012 electrodes are introduced. A. O. SMITH CORP. Pages 34-35.

30 **Iron powder electrode** and how it speeds welding is explained in literature. LINCOLN ELECTRIC CO. Page 39.

31 **Welding goggles** in transparent green plastic with ultra-violet ray inhibitor are featured. CHICAGO EYE SHIELD CO. Page 40.

26 **Hard facing guide book** gives instructions on building up of crusher rolls and other earthmoving equipment. STOODY CO. Page 45.

33 **Abrasive products** for every weld grinding and finishing operation are featured. MANHATTAN RUBBER DIV., RAYBESTOS-MANHATTAN, INC. Page 46.

34 **Iron powder electrode** that offers speed and good bead appearance is introduced. A. O. SMITH CORP. Pages 50-51.

35 **Air-gas torches** for every possible application are featured in complete new brochure. NATIONAL WELDING EQUIPMENT CO. Page 52.

36 **New resin sander disc** that is ideal for weld finishing is introduced. CARBORUNDUM COMPANY. Pages 56-57.

38 **Facts on silver brazing alloys** are included in Bulletin 20. HANDY & HARMAN. Page 62.

39 **Rod drying ovens** which prevent moisture pick-up by welding electrodes. DESPATCH OVEN CO. Page 64.

Got Flame Cutting Problems?

Small or large . . . OHMSTEDE'S time and labor saving flame cutting machine gives you faster, easier cutting at lower cost. Here are 8 big reasons why OHMSTEDE is your best buy.

- Unlimited variety of shapes
- Wide Cutting range—cuts 42" dia. circle and straight line of 89"
- Spindle and automatic magnetic tracing
- Operates on either alternating or direct current
- Delivered with base—no extras required
- Sealed ball bearing construction
- Enclosed motor
- Low initial cost

WRITE FOR COMPLETE SPECIFICATIONS.
ASK FOR BULLETIN 42-52.

OHMSTEDE MACHINE WORKS

897-899 N. Main St. • Beaumont, Texas

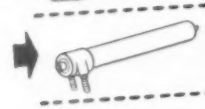
Circle No. 20 on Reader Service Card.

WW ALLOYS, INC.

for the BEST in Resistance Welding....

ELECTRODES

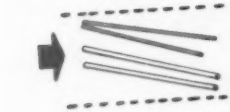
KAPTRODES


HOLDERS

SEAM WELDING WHEELS

CASTINGS

FORGINGS


ROD and BAR STOCK

COLD FORMED OFFSET TIPS

The **ALLOYS** *are right*

WW Alloys are made under strict metallurgical control . . . are specifically suited to their function.

The **DESIGN** *is right*

Time-tested and field-proven, WW design is universally accepted—each unit is truly "job-engineered".

The **DELIVERY** *is right*

Thousands of items are carried in stock for shipment the same day order is received.

Ask for our New Catalog

WW®

42803

"ONE OF THE FANSTEEL INDUSTRIES"

WW ALLOYS, INC.

Division of Fansteel Metallurgical Corporation

11644 CLOVERDALE AVENUE, DETROIT 4, MICHIGAN

Circle No. 21 on Reader Service Card.

40 **Automatic welder and positioner** for rebuilding circular shapes is featured. SIGHT FEED GENERATOR CO. Page 65.

41 **Aluminum welding wire** for consumable electrode inert arc welding is introduced. ALUMINUM COMPANY OF AMERICA. Pages 66-67.

42 **Interchangeable respirators** in both single and double cartridge styles are introduced. WILLSON PRODUCTS, INC. Page 68.

43 **Hard facing alloys** for a wide variety of applications, including die rebuilding, are featured in literature available. HAYNES STELLITE CO. Page 73.

45 **Repair of ductile iron parts** with special electrode for cast iron welding is described in free folder. INTERNATIONAL NICKEL CO., INC. Page 79.

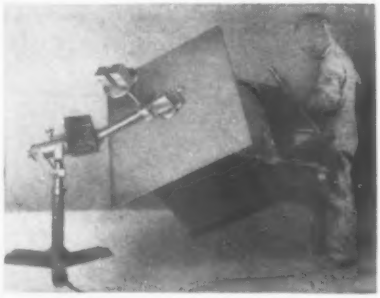
46 **Welding design manual** and **automotive maintenance manual** give actual case histories. EUTECTIC WELDING ALLOYS CORP. Page 80.

48 **Welding positioners** and how they can cut costs, increase welding speeds is subject of Bulletin 228A. WORTHINGTON CORP. Page 82.

50 **Metal spraying unit** for application of powdered hard facing alloys is subject of Spraywelder Catalog. WALL COLMONOY CORP. Page 87.

54 **Complete buyers' guide** features complete lines of welding electrodes and rods, brazing, soldering and

New HIGHSPEED Electrodes *demand* Downhand Positioning



with *Aronson*

Universal BALANCE Positioners

You get INSTANTLY ANY and ALL POSITIONS

See them at the National Metal Exposition Nov. 1-5

Aronson **MACHINE COMPANY**

ARCADE, NEW YORK

Circle No. 7 on Reader Service Card.

for cost-conscious purchasers of welding accessories

PENOPTIC

WELDING HELMETS

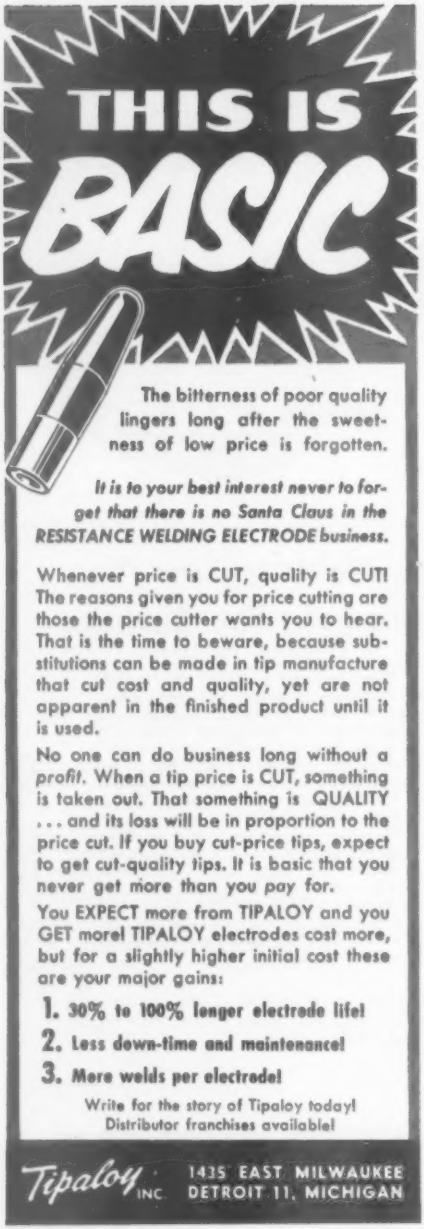
A Model For Every Welding Operation
Every Model At Direct-To-You Savings

Penoptic welding helmets are ruggedly constructed to assure best performance under severest conditions . . . priced lower under Penoptic's streamlined, manufacturer-to-you distribution policy. Both the fabricated and one-piece molded shells are heat and flame-resistant, non-reflecting and amazingly lightweight. Whether you choose stationary or lift-front lens holder you get "light-tight" construction that seals out all glare and injurious rays. In headgears, you have a choice of standard or ratchet type adjustment . . . both positive-locking . . . both equipped with genuine leather, felt-padded sweatbands. Penoptic filter plates that meet Federal Specifications are standard equipment on all models.

For prices and full information write Pennsylvania Optical Company, Reading, Pa. or 1712 Taraval St., San Francisco 16, Cal.

PENNSYLVANIA OPTICAL COMPANY
READING, PENNSYLVANIA
Known For Fine Ophthalmic Products Since 1896

Circle No. 23 on Reader Service Card.


THIS IS
BASIC
The bitterness of poor quality lingers long after the sweetness of low price is forgotten.
It is to your best interest never to forget that there is no Santa Claus in the RESISTANCE WELDING ELECTRODE business.
Whenever price is CUT, quality is CUT! The reasons given you for price cutting are those the price cutter wants you to hear. That is the time to beware, because substitutions can be made in tip manufacture that cut cost and quality, yet are not apparent in the finished product until it is used.
No one can do business long without a profit. When a tip price is CUT, something is taken out. That something is QUALITY . . . and its loss will be in proportion to the price cut. If you buy cut-price tips, expect to get cut-quality tips. It is basic that you never get more than you pay for.
You EXPECT more from TIPALOY and you GET more! TIPALOY electrodes cost more, but for a slightly higher initial cost these are your major gains:
1. 30% to 100% longer electrode life!
2. Less down-time and maintenance!
3. More welds per electrode!
Write for the story of Tipaloy today!
Distributor franchises available!
Tipaloy INC. 1435 EAST MILWAUKEE DETROIT 11, MICHIGAN

Circle No. 22 on Reader Service Card.

tinning alloys. ALL-STATE WELDING ALLOYS CO., INC. Page 91.

55 **Triggermatic vise pliers** that are copperplates for protection against weld spatter are featured. H. R. BASFORD CO. Page 92.

56 **Eight industrial arc welders** are featured in descriptive literature. TRINDL PRODUCTS, LTD. Page 92.

59 **Complete clamp catalog** describes welding clamps that are shielded against spatter. ADJUSTABLE CLAMP CO. Page 96.

60 **Carbon welder brushes** for all types and makes of welding equipment are featured in BECKER BROS. CO. catalog. Page 96.

63 **"Piston ring" gas seals** for oxy-acetylene welding torches are featured. LINDE AIR PRODUCTS CO. Page 99.

66 **Applications data** on use and installation of square manganese-steel applicator bars is available. STULZ-SICKLES CO. Page 101.

68 **"More Profit Dollars"** is title of free folder that describes shape cutter and beveler for use on pipe. H&M PIPE BEVELING MACHINE CO. Page 102.

70 **Resistance welding machines** — new, rebuilt and used — are featured in welder list. ROBT. W. HOFFMAN CO., INC. Page 103.

72 **Welding hose repair kit** is described in literature. GAS ARC SUPPLY. Page 104.

80 **Positioning equipment** for increased welding efficiency is described in Catalog No. 54. UNIQUE TURNTABLE & EQUIPMENT CORP. Page 107.

91 **New lightweight electrode holder** is among electrode holders featured in descriptive folder. DURO ENGINEERING CO. Inside Back Cover.

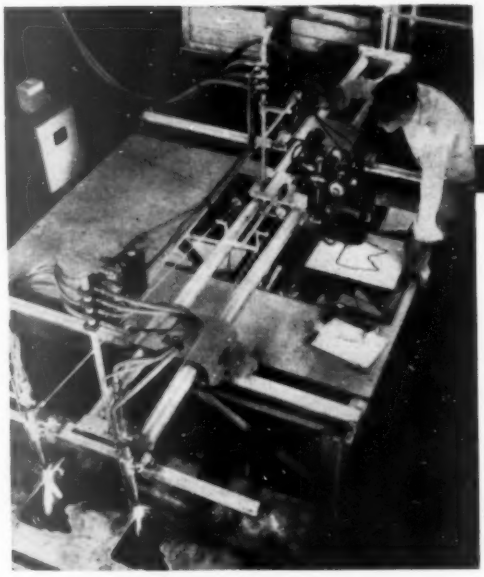
AT THE FRONTIERS OF PROGRESS YOU'LL FIND . . .

New AIRCO #48 DUOGRAPH

(see it at the Metal Show—Booth 341)

Rectilinear shape cutting machine

close-tolerance accuracy at moderate cost



$3450.

(basic unit with manual tracer)

FEATURES:

- 48″ x 51″ cutting area (one table)
- up to 4 torch operation
- centralized controls
- gas-saving solenoid valves
- accurate cuts, no scale or slag

Use the Airco Duograph #48 with any Airco Manual, Magnetic or Electronic Tracer. Cut four 4-foot circles at once. Additional table increases length to 131″. Cutting speeds 3″ to 30″ per minute.

Ask your Airco Representative for illustrated booklet containing complete details and specifications. Or, write Airco at address below.

AIRCO®

AIR REDUCTION

60 East 42nd Street • New York 17, N. Y.

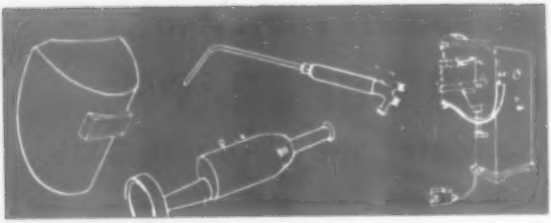
Divisions of Air Reduction Company, Incorporated, with offices and dealers in most principal cities

Air Reduction Sales Company

Air Reduction Pacific Company

Represented Internationally by Airco Company International

Circle No. 28 on Reader Service Card.



advertisers product index

This "Equipment Index", compiled for easy reference, represents only those advertisers **in this issue** whose product information was available prior to our closing date. All of our advertisers, however, are prepared to supply you with full particulars regarding their equipment, services and materials necessary to most effectively carry out your welding program.

ACETYLENE GENERATORS
Independent Engineering Co. 74

ALUMINUM WELDING
All-State Welding Alloys Co., Inc. 91
Aluminum Co. of America 66-67
Eutectic Welding Alloys Corp. 80
Hobart Bros. Co. 1

ANTI-SPATTER COMPOUNDS
Midland Paint & Varnish Co. 105

ARC WELDING ELECTRODES
Alloy Rods Co. 13
All-State Welding Alloys Co., Inc. 91
Chicago Hardware Foundry Co. 93
Drawalloy Corp. 32
Eutectic Welding Alloys Corp. 80
General Electric Co. 8-9, 10
Hobart Bros. Co. 1
International Nickel Co., Inc. 79
Lincoln Electric Co. 39
Marquette Mfg. Co. 100
Reid-Avery Co., Inc. 18-19
A. O. Smith Corp. 34-35, 50-51

ARC WELDING MACHINES
General Electric Co. 8-9, 10
Hobart Bros. Co. 1
Lincoln Electric Co. 39
Marquette Mfg. Co. 100
Miller Electric Mfg. Co. 21, 105
A. O. Smith Corp. 34-35, 50-51
Trindl Products, Ltd. 92

AUTOMATIC WELDING EQUIPMENT & WIRE
Aluminum Co. of America 66-67
Drawalloy Corp. 32
Reid-Avery Co., Inc. 18-19
Sight Feed Generator Co. 65

BENDING & FORMING TOOLS
Acorn Iron & Supply Co. 104
Hossfeld Mfg. Co. 97
Stahl Equipment Co. 111

BRAZING ALLOYS & SHIMS
All-State Welding Alloys Co., Inc. 91
Eutectic Welding Alloys Corp. 80
Handy & Harman 62

BRONZE WELDING ROD
Titan Metal Mfg. Co. 6

CARBIDE
Shawinigan Products Corp. 108

CARBON PRODUCTS
Becker Bros. Carbon Co. 96

CAST IRON WELDING
All-State Welding Alloys Co., Inc. 91
Chicago Hardware Foundry Co. 93
Eutectic Welding Alloys Corp. 80
Hobart Bros. Co. 1
International Nickel Co., Inc. 79

CLAMPS for WELDING
Adjustable Clamp Co. 96
H. R. Basford Co. 92
Chicago Boiler Co. 105
Petersen Mfg. Co. 89

CONTROLS for WELDING
Pierce Governor Co., Inc. 111

CYLINDER TRUCKS
Welded Truck & Specialty Div. of Wallace Tube Co. 104

ELECTRODE HOLDERS & GROUND CLAMPS
Duro Engineering Co. Inside Back Cover
Jackson Products Inside Front Cover
Wagner Mfg. Co. 31

ELECTRODE DRYING OVENS
Despatch Oven Co. 64
Phoenix Products Co. 14

FLUXES
All-State Welding Alloys Co., Inc. 91
Eutectic Welding Alloys Corp. 80
Handy & Harman 62
Northeast Metals Co. 107

FLUX RECOVERY EQUIPMENT
Invincible Vacuum Cleaner Mfg. Co. 20

GALVANIZING COMPOUNDS
Metalloy Products Co. 106

GRINDING & CUTTING WHEELS, BELTS & ACCESSORIES
Carborundum Company 56-57
Manhattan Rubber Division, Raybestos-Manhattan, Inc. 46

HARDFACING PRODUCTS
Allied Steel & Tractor Products, Inc. 105
Haynes Stellite Co. 73
Sight Feed Generator Co. 65
Stoody Company 45
Stulz-Sickles Co. 101
Wall-Colmonoy Corp. 87

HELMETS, GOGGLES, LENSES & FACE SHIELDS
Chicago Eye Shield Co. 40
Hobart Bros. Co. 1
Kedman Company 97
Pennsylvania Optical Co. 27
Willson Products, Inc. 68

METAL MARKING CRAYONS
Whittaker, Clark & Daniels, Inc. 110

METAL SPRAY WELDING
Wall Colmonoy Corp. 87

All Electrode Holders are NOT The Same

NEW HI-AMP WAGNER WELDING PRODUCTS

• HOLDERS •

Cooler, Lighter, Safer, More Efficient and Most Economical on the Market.

EXCLUSIVE FEATURES

- PLASTIC HANDLE—For cooler operation, moisture resistance.
- SPRING TENSION ADJUSTMENT—For proper rod grip, easier replacement.
- MORE EFFICIENT CABLE CONNECTIONS—Either soldered or mechanical connections. Latter can be kept *really tight* without removing handle.
- NEW ARC RESISTANT COPPER ALLOY.

All Ground Clamps are NOT The Same

NEW HI-AMP WAGNER WELDING PRODUCTS

• GROUND CLAMPS •

500 AMP

Exclusive features offered *only* by these new clamps make them the most efficient, most economical on the market. COMPLETELY ENCLOSED SPRING — it cannot be knocked out or shorted out. SPECIAL COPPER ALLOY and broad, flat base makes positive powerful contact. EASY TENSION ADJUSTMENT and powerful spring assure good weld quality.

HI-AMP GROUND CLAMPS ARE MORE RUGGED, BETTER ENGINEERED AND MORE EFFICIENT.

Wagner HI-AMP Welding Products are sold *only* thru qualified Welding Supply Distributors and Dealers throughout the United States.

Weld with Wagner

WAGNER MANUFACTURING COMPANY
350 W. Adams St. Jackson, Mo.

The HI-AMP Story

Write for FREE interesting data explaining why WAGNER welding products are better

Circle No. 32 on Reader Service Card.

OXY-ACETYLENE WELDING & CUTTING EQUIPMENT & ACCESSORIES
Air Reduction Sales Co. 29
All-State Welding Alloys Co., Inc. 91
Chicago Hardware Foundry Co. 93
Eutectic Welding Alloys Corp. 80
Harris Calorific Co. 15
Linde Air Products Co. 99
Marquette Mfg. Co. 100
National Cylinder Gas Co. 23
National Welding Equipment Co. 52
Smith Welding Equipment Co. 106
Titan Metal Mfg. Co. 6
Velocity Power Tool Co. 90
Victor Equipment Co. 4
Weldit, Inc. 3

PIPE WELDING TOOLS
H & M Pipe Beveling Machine Co. 102
Jewel Mfg. Co. 111
Petersen Mfg. Co. 89
Vogel Tool & Die Corp. 103

PNEUMATIC TOOLS
Master Pneumatic Tool Co., Inc. 16

POSITIONERS & TURNING ROLLS
Acme Mfg. Co. 2
Aronson Machine Co. 26
Cullen-Friestedt Co. 17
Unique Turntable & Equipment Corp. 107
Worthington Corp. 82

RESISTANCE WELDING EQUIPMENT & ACCESSORIES
Ampco Metals, Inc. 93
J. W. Dice Co. 109
Eisler Engineering Co. 109
Flint Products Co. 110
Robt. W. Hoffman Co., Inc. 103
P. R. Mallory & Co., Inc. 33
Ohmstede Machine Co. 24
Ransome Company 88
Tipaloy, Inc. 28
W W Alloys, Inc., Div. of Fansteel Metallurgical Corp. 25

TEMPERATURE INDICATION
Tempil Corp. 75

TIP CLEANERS
Maitlen-Benson, Inc. 81

TUNGSTEN ELECTRODES
North American Philips Co., Inc., (Elmet Division) 7

WELD CLEANING TOOLS
Atlas Welding Accessories Co. 11

WELDING CABLE
Stahl Equipment Co. 110

WELDING CURTAINS
A. Smith & Son, Inc. 100

WELD HOSE & REPAIR PARTS
Gas Arc Supply 104

WELDING PLATENS
Acorn Iron & Supply Co. 104
Stahl Equipment Co. 111

WELDING TAPE RULES
Carlson & Sullivan, Inc. 101

FOR QUALITY WELDMENTS USE
***Drawalloy* CORPORATION**
QUALITY CONTROLLED
STAINLESS STEEL
Welding Wire

- **available in Spools, Coils and Lengths**
- **for Automatic and Semi-Automatic gas and inert arc welding**

Welding wire by Drawalloy is made to an exacting high standard... a high standard established by long-experienced welding men who know welding wire and how it must work. Set-ups for automatic and semi-automatic welding take more time than regular welding. That's why you want to be sure of satisfaction *before* you start. This *reliable* wire is weld-tested to give the best results every time. Write today for complete information and prices.

WELDING SUPPLY DISTRIBUTORS: Get prompt delivery on all sizes and grades of stainless and tool steel wire for gas and inert arc welding.

Drawalloy
CORPORATION
Lincoln Highway at Alley Street • York 11, Pennsylvania

Circle No. 27 on Reader Service Card.

★

Mallory Welding Electrodes Cover Many "Special" Jobs

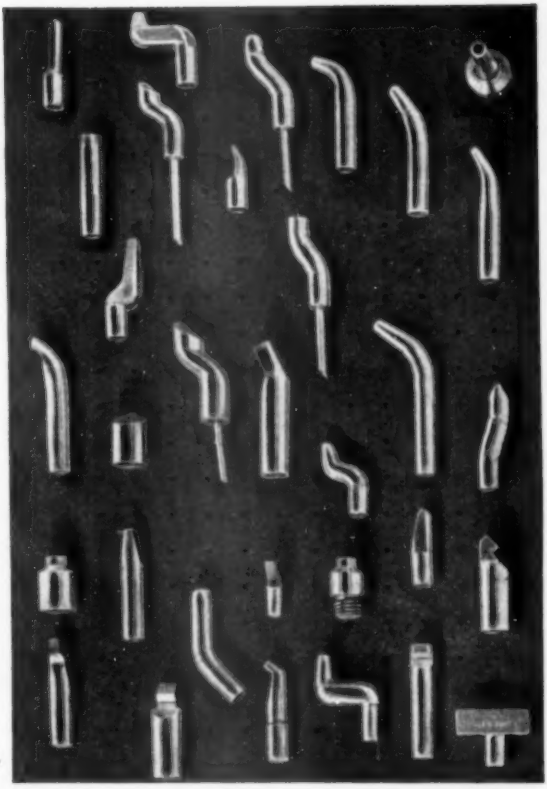
Odd-shaped resistance welding electrodes that you consider "specials" may well be standard items for Mallory. Just a few of the single-bend, double-bend and irregular shapes which we can supply are shown here. The complete list covers dozens of others, in a choice of sizes, tapers and alloys.

Many Mallory standard electrodes were once considered "special."

It will pay you to scan through the wide selection that Mallory offers, any time your welding work calls for electrodes that are out of the ordinary. Why not avoid the cost and delay of special tooling? And you will gain exclusive Mallory performance features that have been developed during more than 25 years of pioneering experience in the welding field.

Single- and double-bend electrodes, for example, are cold-formed by special Mallory techniques which produce maximum hardness and strength. The water cooling tube is bent in place by a patented Mallory process, to give better cooling and longer electrode life. Mallory's extensive selection of alloys permits an almost unlimited choice of physical and electrical properties for tips and inserts.

Mallory welding engineers will be glad to recommend standard electrodes for your application, or to design and produce special types for unusual requirements.



See Mallory for all your resistance welding materials

Available from Mallory is a complete line of straight and bent electrodes, holders, dies, forgings, castings and seam welding wheels. All are described in the latest edition of the Mallory Resistance Welding Catalog. Write for a copy today, or get one from your nearby Mallory distributor.

Expect More . . . Get More from MALLORY

Resistance Welding Electrodes, Holders, Dies, Rods and Bars, Castings, Forgings

P. R. MALLORY & CO. Inc.

MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

For information on titanium developments, contact Mallory-Sharon Titanium Corp., Niles, Ohio

Circle No. 25 on Reader Service Card.

No single electrode is best
Job-match
A.O.Smith
SW-11
A.O.Smith
SW-12
A.O.Smith
SW-17
SW-11
Here's a "cold" E-6012. Designed for all position welding with minimum penetration, maximum throat thickness. Performance is exceptional when fit-up is poor . . . bridges over, won't burn through. Operates much better on A.C. than ordinary E-6012 electrodes. Widely used for truck bodies, farm machinery, foundry equipment, storage tanks, etc.
Produced by welders for welders
Because welding is our full-time business, we offer you the top line of welder-proved equipment and accessories. Everything from a-c and d-c welding machines to helmets and cleaning tools.

Circle No. 29 on Reader Service Card.

for every job in AWS Class E-6012

your electrodes with A. O. Smith's

BIG THREE

BECAUSE welding is A. O. Smith's *full-time* business — because we constantly use every type of welding electrode right in our own shops — we know this for a fact:

You can't handle every job in AWS Class E-6012 with just one electrode. There's no one-shot cure-all!

That's why we give you the BIG THREE — three fine electrodes, each tailored to deliver top performance on different Class E-6012 jobs.

A. O. Smith's BIG THREE lets you job-match your electrodes . . . helps you pick the one that's exactly right for your particular operation.

Check the details in this ad. Then, see your A. O. Smith distributor . . . or write direct. A. O. Smith Corporation, Welding Products Division, Milwaukee 1, Wisconsin.

SW-12 This is a "hot" E-6012 . . . versatile, smooth and fast. Designed for applications where the upper end of the amperage range is employed. Weld deposition is much faster than with the SW-11. Weldor can hold a close arc without sticking. SW-12 also works well where fit-up is poor . . . bridges across, assures a good weld and won't penetrate through. ●

SW-17 A "hot" E-6012, can take from 30-40 more amperes than others. A general purpose high rutile type of electrode for heavy production welding, where fit-up is poor and high ductility and mechanical properties are desired. Built-in toughness is one outstanding characteristic. Deposition is extremely fast, physicals are excellent. It is highly recommended for horizontal single pass fillet work.

Through research A.O. Smith *. . . a better way*

A.O.Smith

CORPORATION

WELDING PRODUCTS DIVISION

Milwaukee 1, Wisconsin

INTERNATIONAL DIVISION: MILWAUKEE 1, WISC.

Circle No. 29 on Reader Service Card.

FACTS ON WELDING TITANIUM

Titanium, fourth most abundant structural element in the crust of the earth, can be welded despite its tendency to oxidize at temperatures exceeding 800° F., and despite its high melting point (3272° F.).

TITANIUM is now becoming available at commercially-feasible prices, due to aircraft industrial requirements which have led to the development of improved ore-processing methods. Titanium should find many important applications by virtue of the following properties:

(a) Oxidation resistance comparable to that of stainless steels, cupro-nickel alloys, etc., in the presence of corrosive chemical solutions at temperatures up to 800° F.

(b) Almost as little weight as aluminum, yet a better strength-weight ratio than most types of steel.

(c) Generally-good fabricational characteristics.

(d) Surface hardenability required to make parts with extreme resistance to wear or abrasion.

(e) Compatability with many other elements where special-purpose alloys are required.

For reasons that should be obvious, pure titanium can be most readily welded with resistance equipment—being, in fact, adaptable to a greater range of spot-welding conditions than stainless steels without difficulties due to electrode sticking. However, it is necessary to do this type of work with electrodes of relatively large dimensions.

Little success can be anticipated in welding pure titanium with oxy-

High welding currents and pressures are required in welding .068-inch cold rolled carbon-titanium alloy sheets with resistance welding electrodes having 3-inch tip radii.

Amps. Weld Current	*Weld Dia. Per Inch*	*Heat Zone Dia., In.*	*Penetration Per Cent*	*Strength Pounds*
8,000	0.266	0.290	77	2700
9,000	0.285	0.300	82	2900
10,000	0.310	0.335	90	3400

acetylene equipment, according to engineers at Ryan Aeronautical Co.; but the metal has been successfully processed by arc welding with electrodes shielded by argon and helium. Further, titanium has been successfully brazed with good results where it was possible to use brazing furnaces and inert gases to fuse nickel-solder materials.

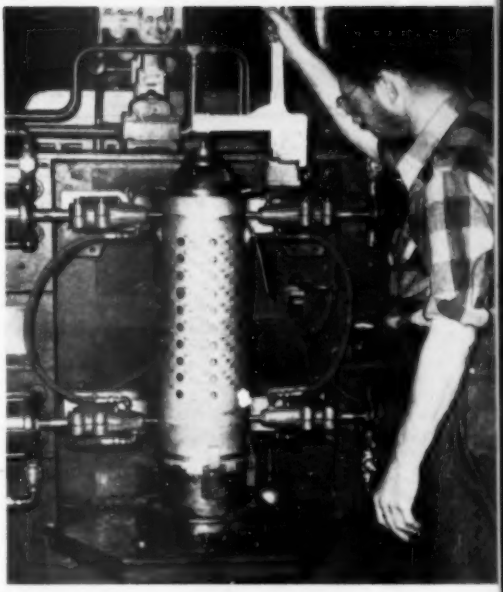
However, efforts to weld pure titanium to dissimilar materials have not yet been too successful because of inadequate fusion. For example, attempts to spot weld titanium to Everdur, Monel and nickel alloys have resulted in nothing more than coarse mixtures of the respective metals; and where it was necessary to fuse titanium with stainless or low-carbon steels, extremely-brittle weld nuggets were usually obtained. Still there is reason to believe that specialized welding techniques — such as the new pulsation-welding process — will eventually solve even these knotty problems.

Importance of Alloying

Titanium alloys in various circumstances combine the advantages and/or disadvantages of pure titanium from the welder's point of view. For instance, engineers have disclosed that relatively high welding currents and pressures are needed for the satisfactory fusion of 0.068" cold-rolled sheets of carbon-titanium alloys with resistance electrodes having 3" tip radii.

The statistics in the accompanying table were obtained with a 10-cycle welding interval, 1000 pounds of pressure, and RWMA Class 2 electrodes installed on a synchronously-controlled 100-KVA welder.

Alloys of titanium and aluminum-chromium or aluminum-iron are probably the most weldable titanium materials, since they may



Special resistance welding unit used at Ryan Aeronautical Co. makes it possible to produce four simultaneous spot welds in titanium assembly.

Automatic inert arc welding is second only to resistance welding as the most rapid and efficient method of fabricating titanium components.

MECHANICAL PROPERTIES OF UNALLOYED TITANIUM

PROPERTY	Annealed Condition	½-Hard Condition	Fully-hard Condition
Ult. Tensile Str., psi	80,000	115,000	125,000
Yield Str., psi (0.2% offset)	72,000	105,000	110,000
Elongation %/2"	25	14	12
Ult. Str./Density x 10^3 at Room Temperature	488	701	763
Ult. Str./Density x 10^3 at 1000° F.	100	140	122

MECHANICAL PROPERTIES OF TITANIUM ALLOYS

ALLOY	Condition	Tensile Str., psi	Yield Str., psi	Elong. in./in.	Hardness
Tungsten-carbon	As Forged	131,000	119,000	21.5	27 Rc
Aluminum	As Forged	113,600		11.0	66 Ra
Manganese-aluminum	As Forged	158,000	106,000	1.5	
Chromium-tungsten	Normalized	149,500			51 Ra
Chromium-molybdenum	Hot Rolled	175,000		4.5	367
Chromium-nickel	Hot Rolled	194,700		3.0	417

An important property of titanium is its compatability with other elements. This makes it easy to develop special-purpose alloys with desired physical properties.

have high oxidation resistance at elevated temperatures as well as good mechanical properties. However, titanium-boron alloys are preferable where considerable ductility is desirable; and various quantities of chromium, molybdenum, manganese, and iron have been used to produce alloys which are simultaneously quite weldable and adaptable to many specialized applications.

Stresses due to the welding or fabrication of titanium and most titanium alloys can be relieved by heating in air for about an hour at temperatures up to about 600° F.

Where surface hardening is necessary, titanium and its alloys may be oxidized, nitrided, etc., the same as conventional types of stainless steels.

LINCOLN "JETWELDING"

...industry's greatest team for low cost, high speed hand welding

Lowest manual welding costs are achieved with "Jetweld", the high speed welding electrode developed and introduced by Lincoln, and "Fleetwelder"—Lincoln's AC transformer-type welder.

For the first time, "Jetweld" utilizes powdered metal in the electrode coating . . . enabling use of higher currents to speed welding. Iron powder becomes an additional source of metal for the weld. Welds are more uniform, free of undercut, of X-ray quality.

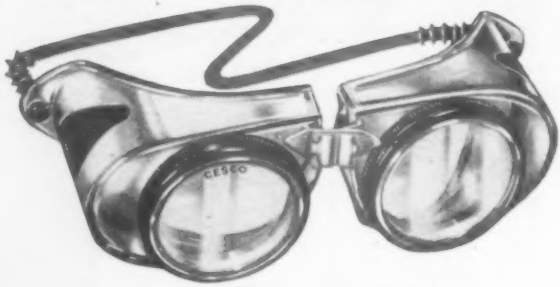
THE RESULT: Average increases in speed of 35%... *and more.*

CHECK LINCOLN'S NEW LOW PRICES Lincoln's new combination of lower AC machine prices and faster welding with "Jetweld" can cut your welding costs. See for yourself. Have your Lincoln representative check your requirements for electrodes and welders. Call or write.

THE LINCOLN ELECTRIC COMPANY
Dept. 1810
CLEVELAND 17, OHIO
THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT
Circle No. 30 on Reader Service Card.

CESCO RIGHT... before your Eyes!

NEW
Weldors' Helpers' Goggles



in transparent green plastic
WITH
ultra-violet ray inhibitor

HERE IS A FLASH GOGGLE designed specifically for weldors' helpers and spot weldors. It won't fog, craze or become brittle when subjected to ultra-violet rays, even when used continuously in open sunlight. That's because it's made from a new plastic formula which contains an ultra-violet ray inhibitor.

These new CESCO Goggles are large enough to be worn comfortably over modern personal glasses, and are furnished with round or flat all rubber or flat elastic headbands. Available in both chippers' and weldors' styles. They can be fitted with 50 mm. Clear Super-Safety, Anti-Glare, or Cescoweld lenses.

Ask your CESCO Safety Equipment Distributor for further information and prices on new CESCO No. 548 and 549 Weldors' Helpers' Goggles, or write us.

CHICAGO EYE SHIELD COMPANY
2334 Warren Boulevard, Chicago 12, Illinois

CESCO

CESCO FOR SAFETY

Circle No. 31 on Reader Service Card.

Twin wire submerged arc welding set-up is inspected by authors Smith (left) and Russell (right). Twin wires keep weld molten for longer period, permitting more time for slag and other impurities to float to top.

Submerged Arc Process Increases Welding Speeds at Caterpillar

by **HOWARD D. SMITH, Welding Technician, Metallurgical Division**
and EVERETT V. RUSSELL, Processing Engineer, Planning Division

THE submerged arc welding process can fill the bill when economy measures or increased production call for speedier welding. That's what Caterpillar Tractor Co. of Peoria, Illinois, discovered in recent years. As a result, the company has almost completely switched to the use of that process (wherever applicable) in the welded fabrication of its tractors, motor graders and earth moving equipment. Of course, changes were not made until the company was sure that its high standards of welding would continue to be met.

The use of the submerged arc process at Caterpillar is not merely limited to the usual manual and automatic operations. Several interesting variations are used to increase welding speeds. These include use of twin welding wires, tandem, or dual welding heads, and a tracer template which guides the welding heads.

Twin Arc Welding

In welding tractor main frames a gradual evolution of welding procedures, which now employs twin welding wires, increased weld quality and almost tripled welding speed, boosting it from 14 to 40 inches per minute.

Automatic welding variations increase production,

In the beginning, automatic open arc welding had been used with a $\frac{5}{16}$-inch diameter coated wire electrode wound on a reel. Amperages of 450 to 475 yielded welding speeds of only eight to nine inches per minute. An open corner $\frac{3}{8}$ by $\frac{1}{2}$-inch fillet weld was used.

A change to manual submerged arc welding then increased welding speeds to 14 inches per minute. Here, a $\frac{5}{64}$-inch diameter low carbon bare steel wire was used with about 500 amps. Changing the joint to a $\frac{3}{8}$ by $\frac{3}{8}$-inch fillet further increased welding speeds to 18 inches per minute.

First Wire Is Scavenger

The latest switch to full automatic welding with twin wires boosted speed to about 40 inches per minute. Two $\frac{3}{32}$-inch wires are fed from a single head using about 1000 amps. The twin welding wires are needed in order to assure sound welds at the highly increased welding speeds. The first wire, which actually makes one-half of the weld, acts as a scavenger to eliminate weld defects, especially in rusty metal. As the weld metal deposited by the first wire begins to solidify, the second wire moves in with more molten weld metal. This keeps weld metal molten for a longer period and permits more time for slag and impurities to float to the top.

Use Dual Welding Heads

Where parallel joints are of sufficient length, use of automatic welding with dual welding heads is ideal. One such case at Caterpillar is the fabrication of frame channels for motor graders. Measuring 24.5 feet long, assemblies consist of 9-inch ship channel sections into which $\frac{7}{16}$-inch thick cover plates are welded. Plates formerly were tacked in place and then

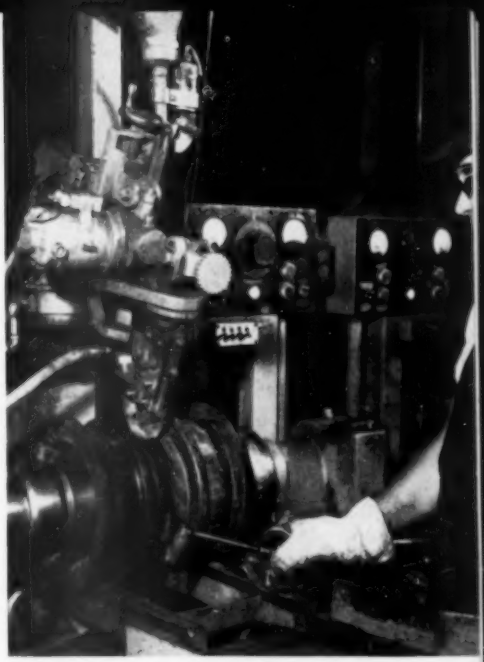
Tracer template device makes it easy to adapt automatic submerged arc welding process for use on irregularly shaped weldments. Tracer follows metal template and controls and guides welding head.

cut operating costs . . .

welded, using automatic open arc welding with ¼-inch diameter coated reel wire at 400 to 450 amps. No edge preparation was done and penetration obtained was only about 50 percent. Welding speeds of a mere eight to nine inches per minute were obtained.

Then the assembly was redesigned for welding with the automatic submerged arc process and dual welding heads. First of all, the channel form was redesigned so that it is received from steel mills with legs rolled to accommodate the cover plate. This gives a readily accessible joint that can be welded with complete penetration.

Now, $\frac{7}{32}$-inch diameter welding wire is used with about 650 to 680 amps. This gives 100 percent penetration and has increased welding speeds to 21 inches per minute. To allow for a considerable variation in thickness and size of frame



Medium high carbon steel rims used in track roller assemblies are fabricated on automatic submerged arc girth seam welder. A finished piece is turned out every 75 seconds.

Where parallel joints are of sufficient length, automatic welding with dual heads more than doubles welding speeds.

channels, 1200 amps welding current is available for use with both heads.

Templates Guide Welding Head

Used widely in flame cutting operations, the tracer template is being used at Caterpillar to make possible use of submerged arc welding and increased speeds in fabricating motor grader tandem assemblies. The tracer follows a metal template and controls and guides welding head as $\frac{5}{8}$-inch top and bottom plates are joined to side plates. Assemblies have two straight joints on each side which measure about six feet in length. These are connected at each end by semi-circular welds that measure some 19 inches. All joints are made by the automatic submerged arc process in one continuous pass. Welding current is about 650 amps and is furnished by two 500 amp A-C welding machines in parallel. Welding wire is $\frac{5}{32}$-inch in diameter.

Joint Design Increased Speed

A minor change in joint detail produced a further increase in welding speeds. Although side plates are not beveled, the end plates into which they fit are. With the original $\frac{5}{16}$-inch 45° chamfer, welding speeds of 18 inches per minute were obtained. Reducing the size of the chamber to $\frac{3}{16}$-inch by 45° increased welding speeds to 27 inches per minute with no sacrifice of weld quality.

Automatic Welding Is Speedy

Caterpillar uses the automatic submerged arc welding process to produce good welds at increased speed in medium high carbon steel rims used on track roller assemblies. Here, two SAE 1046 steel rims are welded after they are pressed onto a cast iron hub. Welds are made in a single pass with $\frac{3}{32}$-inch diameter welding wire at 440 amps. Welds are overlapped about two inches on 22-inch circumference to eliminate craters and give good tie-in with beginning of weld. Welding is done in an automatic set up which chucks and positions assemblies for welding. A finished piece is turned out every 75 seconds. The operator merely inserts assemblies in the machine and presses a switch to start welding.

Some interesting uses of preheating are found in this operation. Rims are first expanded by induction heating to 500 or 600° F. This makes it easy to press fit them on cast iron hubs. However, the assembly then has non-uniform temperatures which must be equalized to prevent the weld from cracking. This is done by holding the entire assembly for about four minutes at

(Continued on Page 74)

Increased strength rather than faster welding was the reason for change to manual submerged arc welding on these track-carrier supports. Process gives operator better control of operations and helps him to make sounder welds.

Circle No. 26 on Reader Service Card. →

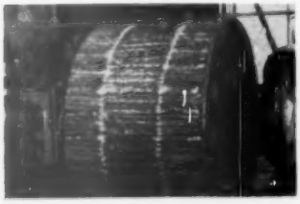
These rolls, hard-faced when new with Coated Tube Stoodite, have been in operation 3 months, crushing extremely hard river rock. When hard-facing is re-applied beads are slightly separated, areas between being filled on successive applications.

IMPROVING CRUSHER EFFICIENCY with Stoody Hard-Facing

All crusher rolls lose sizing efficiency because of uneven wear. As roll centers become worn, a gap develops between them, permitting oversize material to pass through. With continued wear, crusher adjustments cannot compensate and efficiency is lost.

BALANCING WEAR RESISTANCE

The answer is use of two Stoody Hard-Facing Alloys of dissimilar wear resistance. Roll centers are protected with Coated Tube Stoodite; outside areas with Stoody 21. *This procedure concentrates extra wear resistance where most needed, at the same time saves money by using a lower cost alloy on edges!* Net result is balanced wear, flatter roll surfaces and more uniform sizing of material over life of the rolls.



HARD-FACING KINKS

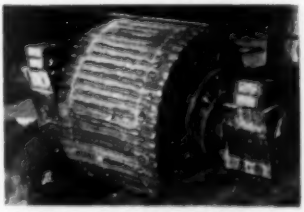
Always skip-weld to avoid overheating. New hard-facing beads can be applied alternately between former deposits.

After repeated welding, manganese rolls may deteriorate from application of heat, causing hard metal to spall. This can be prevented by applying a layer of Stoody Nickel or Moly-Manganese to the parent metal after 3 or 4 hard-facing applications. If crusher rolls are carbon steel, use Stoody Build-Up.

IMPROVING GRIP

A better grip is possible if one roll is hard-faced with a series of spaced stringers, forming corrugations. Follow the same bi-metal technique for balancing wear.

By repeating hard-metal applications, as required, three times normal life is not unusual for crusher rolls. This and other crusher hard-facing techniques are described in the Stoody Hard-Facing Guidebook.



This illustration shows method of spacing stringer beads on one roll to improve grip. Coated Tube Stoodite is applied in center area, Stoody 21 on outer edges.

Ask your Stoody dealer for a copy (See the yellow pages of your phone book) or write direct!

STOODY COMPANY
11924 East Slauson Avenue
Whittier, California

FAST CUTTING..SAFE..LONG LASTING

MANHATTAN MOLDISCS

Manhattan Moldiscs give clean, fast cutting action right down to the last usable part of the wheel. They will not load or glaze when grinding mild steel, stainless alloys, aluminum or copper. Manhattan Moldiscs are safe because they are reinforced for breakage resistance. Both roughing and finishing operations may be done with the same Moldisc, saving time and labor.

Actual tests show that Manhattan Moldiscs outlast 25 to 30 coated sanding discs, with additional savings in down-time normally required for disc changes. Made in various resiliencies and bond types. For "MORE USE PER DOLLAR," specify Moldiscs and other types of high speed, heavy duty Manhattan Abrasive Wheels.

RM-437-R

WRITE TO ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose
Fan Belts • Brake Linings & Blocks • Clutch Facings • Packings • Asbestos Textiles
Engineered Plastic, and Sintered Metal Products • Abrasive & Diamond Wheels • Bowling Balls

Circle No. 33 on Reader Service Card.

Welding of copper-base alloys presents few difficulties that cannot be overcome. All that is required is proper welding techniques, correct joint preparation and back-up, sufficient preheat and an understanding of metallurgical changes that may take place when welding a specific alloy. Here's the complete story on . . .

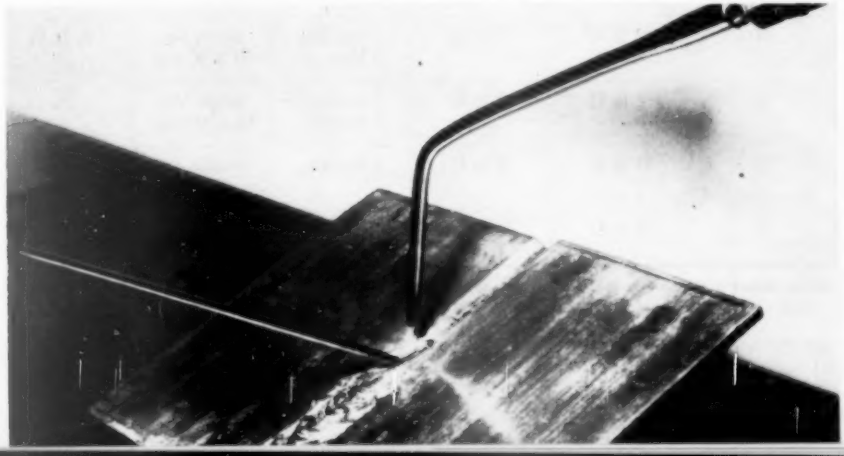
Oxy-Acetylene Welding of Copper

The second in a series on welding of copper-base alloys, this article will be followed by other articles on fabrication of copper-base alloys by the various arc welding and resistance welding processes.

OXY-ACETYLENE welding of copper base alloys has certain considerations that are very similar to arc welding. The first similarity is that joint designs are usually adequate for gas welding. Another similarity is that tack welding is very frequently employed to maintain alignment. In the event that long seams are being welded and there is a chance of the gap closing, tack welding interspersed with wedges or clips is often employed; this method is often preferred over tack welding since it eliminates the interruption caused by melting out tack welds. Wedges or clips are removed a few inches ahead of the welding action. Jigging is essential. In addition, sections to be welded should not be held too tightly, since cracking of the weld deposit may occur during the cooling stage.

Where the highest quality welds are desired, deoxidized copper should be used as the base metal. Thus, the difficulties associated with the oxygen content of electrolytic tough-pitch copper are avoided. Oxy-acetylene welds in deoxidized copper are fusion welds in that the base metal is melted along with a filler rod. Forehand welding is usually employed; however, in the welding of heavy

Fusion welding of copper is done with oxy-acetylene welding equipment. Position of work, torch and welding are shown. Torch is used in backhand position.



plate, the backhand method is used since it gives a higher concentration of heat on the weld area.

Care must be taken so that the welds and the adjacent base metal are not held at high temperatures for excessive lengths of time. In addition, torch tip sizes should be large enough to enable welding to progress at a speed of at least two inches per minute. If necessary, to attain satisfactory speed on heavy work, a second torch may be employed for pre-heating, usually to approximately 800° F.

Use Deoxidized Copper Rods

Deoxidized copper rods, E Cu, are more frequently used; this rod allows initial contraction caused by solidification of the base metal in the weld zone to take place before the welding rod solidifies. A slightly oxidizing flame can be used where the material is welded without flux; however, when flux is employed the recommended flame should be neutral. It is suggested that the filler rods be pre-fluxed to assure uniform fluxing and fewer removals of the rod from the weld. Painting the flux paste on clean rods is the preferred method. "Puddling" of the weld is not usually necessary.

Welds ¼ inches or less in thickness can usually be completed in one operation. Heavier work requires multi-pass welding technique. To prevent cracking of the weld, the second and succeeding bead should not be started from the end of a joint. The start should be made several inches in from one end and the weld carried to both ends from that point. Weld strengths approaching that exhibited by the base metal will be realized. In addition, peening of the weld deposit will increase the tensile strength of the weld with an accompanying reduction in duc-

Table 1. Data on Oxy-Acetylene Welding of Copper.

Thickness of Base Metal, Inches	Welding Tip Size, drill size	Heating Tip Size, drill size	Number of Operators	Joint Design	Spacing, ins. (tack welded 5 inches C to C)
1/16	55 to 58	.....	1 Welding	Flange	None
1/16	55 to 58	.....	1 Welding	Square Butt	1/16 to 3/32
1/8	51 to 54	.....	1 Welding	Square Butt	3/32 to 1/8
3/16	48 to 50	43 to 46	1 Welding 1 Heating	Single Vee 60 to 90 deg.	1/8 to 3/16
1/4	43 to 46	43 to 46	1 Welding 1 Heating	Single Vee 60 to 90 deg.	1/8 to 3/16
3/8	38 to 41	38 to 41	1 Welding 1 Heating	Single Vee 60 to 90 deg.	3/16
1/2	38 to 41	38 to 41	2 Welding	Double Vee 90 deg.	3/16
3/4	38 to 41	38 to 41	2 Welding	Double Vee 90 deg.	3/16

Note: Select a tip one or two sizes larger than that normally used for steel of the same thickness. Use a neutral flame adjustment.

tility; this is particularly true where cold peening is performed.

Oxy-acetylene welding of the low brasses, such as gilding metal, commercial bronze and red brass, is done in almost any position, a 1½-percent silicon electrode being recommended.

Rod Selection Is Important

Rod selection is of particular importance where corrosion resistance of the weldment is of importance. The high brasses, such as cartridge brass, yellow brass, muntz metal, naval brass and manganese bronze, indicate a greater tendency toward zinc volitalization. However, this undesirable feature is minimized by both rod selection and technique.

Welding of the high brasses is usually done by the forehand method; the flame being slightly neutral to oxidizing. The inner cone of the flame should never be applied directly to either the welding rod or the deposited metal. The filler metal, which is approximately the same composition as the base metal, should be pre-fluxed. For best results, the filler rod should be melted and given just enough additional heat to make it flow freely and take to the preheated base metal. It is advisable to pre-heat the base metal by proper manipulation of the torch flame as welding advances. Difficulties in the welding of the leaded brasses can be expected.

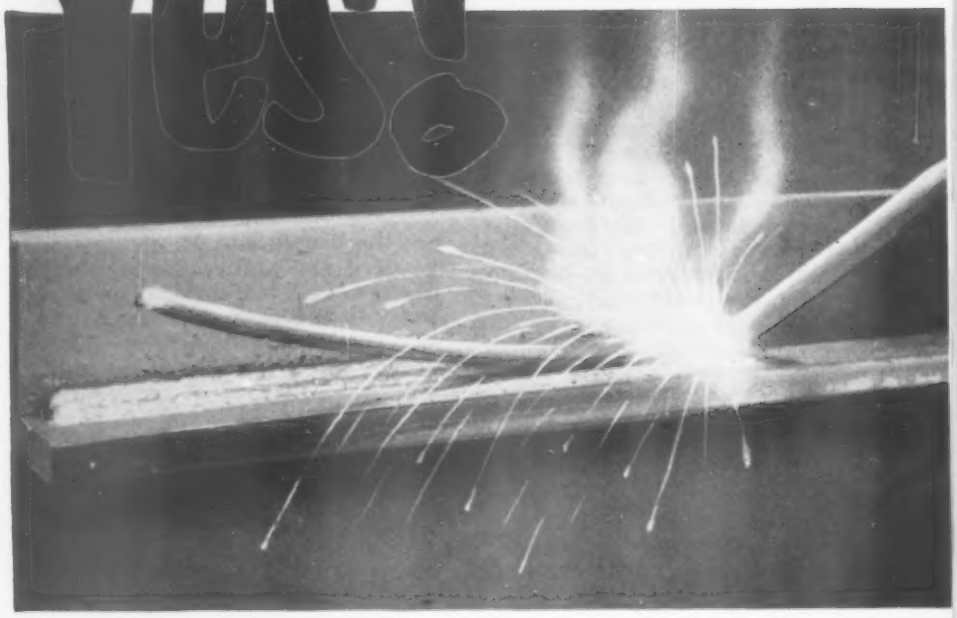
The silicon bronze alloys are quite readily welded by this method; the precautions for multi-pass welding apply. In general, these alloys have lower thermal conductivity than copper, they are not as sensitive to overheating as other copper alloys, and during welding,

(Continued on Page 107)

Table 2. Suggested Procedure for Oxy-Acetylene Welding the Copper-Silicon Alloys.

Metal Thickness, Inches		Number of Beads	Welding Rod Diameter, Inches	Tip Size	Remarks
3/16		1	1/8	4	
3/32		1	3/32	5	
1/8		1	3/16	6	1/16 inch space between edges
5/32		1	3/16	7	3/32 inch space between edges
3/16		1	3/16	8	1/8 inch space between edges
1/4	Double Vee	1	3/16	8	45 deg. bevel; 1/16 in. space between edges
	Single Vee	1	3/16	8	
3/8	Double Vee	1	1/4	10	45 deg. bevel; 1/16 in. space between edges
	Single Vee	2 1 2	3/16 1/4	8 10	Entire length of joint 1/3 full complete with reinforcement
1/2	Double Vee	1	5/16	10	30 deg. bevel; 1/16 in. space between edges
	Single Vee	2 1 2	1/4 3/16	8 10	Entire length of joint 1/3 full complete with reinforcement

Yes! Slag peels as



For AWS Class E-6020 work, A. O. Smith offers the job-proved SW-45 heavy-coated iron powder electrode. Here's high physicals and consistent x-ray quality plus fast deposition, good bead appearance, ease of cleaning. Like the SW-44, it's the high-speed answer for horizontal and down-hand fillet and groove welding.

Circle No. 34 on Reader Service Card.

you weld!

Unretouched photo proves SW-44's fine ripples, good wash-up and complete absence of undercut.

New A.O.Smith SW-44 iron powder electrode offers outstanding speed, bead appearance

THROUGH RESEARCH . . . A BETTER WAY. Once again the A. O. Smith laboratories have advanced the ease and speed of welding. This time it's the SW-44 — a *perfected* iron powder electrode that's practically *self-cleaning*.

Not only can you deposit far more E-6012 type of weld metal than with conventional electrodes—you *almost eliminate the job of cleaning*. There's good wash-up with no undercut. What's more, bead appearance is outstanding — flawlessly smooth with fine ripples. It's as easy as squeezing toothpaste out of a tube. And re-striking is easy . . . even with a completely cooled rod.

If you haven't tried the new SW-44, see your A. O. Smith distributor today. Or you can get all the facts on this and other A. O. Smith iron-powder electrodes from A. O. Smith Corp., Milwaukee 1, Wis.

Through research ...*a better way*

A.O.Smith
CORPORATION

WELDING PRODUCTS DIVISION
Milwaukee 1, Wisconsin

INTERNATIONAL DIVISION • MILWAUKEE 1, WIS.

Circle No. 34 on Reader Service Card.

here is an additional line every welding supply distributor can handle profitably

whether or not you are now handling our line of welding and flame cutting apparatus these many air-gas torches will be of interest to you and can be handled by you at a desirable profit. Our brochure No. 8 illustrates and describes equipment which is noncompetitive but supplementary.

Is natural gas scheduled to replace a manufactured gas in your territory? If so, we have something of special interest to you and your Gas Company. If this conversion has been made in the past, we have equipment your customers will be interested in. We have designed, produced and used torches and other items for the control of flammable gases since 1910; and we have cooperated with gas manufacturers and public utility companies for many years. Please look at the column to your right for a partial listing of some of the torches our brochure illustrates and describes in a colorful and interesting manner . . . **write for it today**

here is a partial list of torches and operations listed in our Brochure #8:

ribbon flame burners for the glass blower and others . . .

crossfires for all fuel gases and either compressed air or pure oxygen . . .

small bench blowpipes for laboratories, radio technicians, electricians, orthodontists and others . . .

air-gas mixers for many purposes and in all capacities . . .

fine needle valves in all sizes . . .

a modern alcohol blowpipe for glazing, heat treating of molding compounds, smoothing wax surfaces or working with plastics . . .

cannon fires which can use many fuel gases with air or oxygen . . .

small air-gas torches for hand or bench use . . .

preheating torches in all sizes and capacities . . .

NATIONAL welding equipment company . . . 218 fremont street san francisco 5 california

it's made by National of California

540 H

Circle No. 35 on Reader Service Card.

All-welded mark 56 gunfire control system with electronic brain accurately tracks a swift-moving jet.

Welding Reduces Weight of Navy Gun Housing by 70 Percent

ARC, inert arc and resistance welding and oxy-acetylene cutting play an important part in the fabrication of the housing and component parts for the U. S. Navy's Mark 56 gunfire control system. Built by Daystrom Instrument, a division of Daystrom, Incorporated at Archbald, Penna., this unit houses delicate electronic instruments and equipment used in tracking and sighting enemy planes.

These various welding processes were chosen to do the job because welded construction provides a definite weight savings, an important factor for this unit which is installed on naval vessels. The present welded model has a weight approximately three-tenths that of the original model.

In addition welding gives neater, stronger metal-to-metal joints and provides an economical means of fabrication, saving both man hours and money.

Weldments Vary in Size

Three major welded components of the unit include the upper housing, the base and the platform. Due to their bulk, these are

"original weighed between 10 and 12 tons, the welded

mounted on welding positioners for ease in handling when welding. These positioners are capable of handling work ranging in weight from 100 lbs. up to eight tons.

In construction of these major components, a variety of steels is used. These range in thickness up to 4-inches and include both mild and high carbon types, high strength-low alloy steels and several varieties of stainless steel. The choice of materials is based on strength and ductility required of welded joints, corrosion resistance, weight saving and appearance.

Weld Thin, Non-Ferrous Metals

In contrast to these bulky items, small assemblies are also welded. One example is spot welding of tiny arms which go into the unit's potentiometer. These are made from coin silver (0.045 thick), phosphorous bronze (0.020 thick) and copper (0.012 thick). This assembly is joined by three-phase spot welders rated at 200 KVA. This same unit is used to weld other non-ferrous metals.

In welding larger assemblies made from non-ferrous metals, the inert arc welding process is used. Welding heat is supplied by 200 and 400 amp A-C inert arc welding machines.

Set-Up for Welding

Flame cutting is used to prepare steel parts for fabrication. Component parts are cut from "job size" paper templates and are accurately traced by an electronic eye device capable of cutting as many as 20 pieces at the same time with multiple cutting tips. The established tolerance of plus or minus $\frac{1}{16}$-inch on flame cut parts provides the best foundation for distortion-free welds, although welding sequences are also set up to minimize distortion. Operators, who do their own set-up and tacking operations, meet set-up toler-

Inert arc welding is used to fabricate aluminum alloy assembly for cockpit enclosure. All larger non-ferrous assemblies are welded by this process.

model weighs 3 or 4 tons" . . .

ances of 0.030 inches.

When forming operations are required, forming rolls and press brakes with capacities up to one-inch are used. Overhead cranes and jib cranes are used to move and lift heavy parts from one place to another.

To insure quality welded joints, all plates forming a critical joint are shot blasted to clean them thoroughly. This reduces the possibility of scale or oxide inclusions in the weld. This practice also provides a better base for painting.

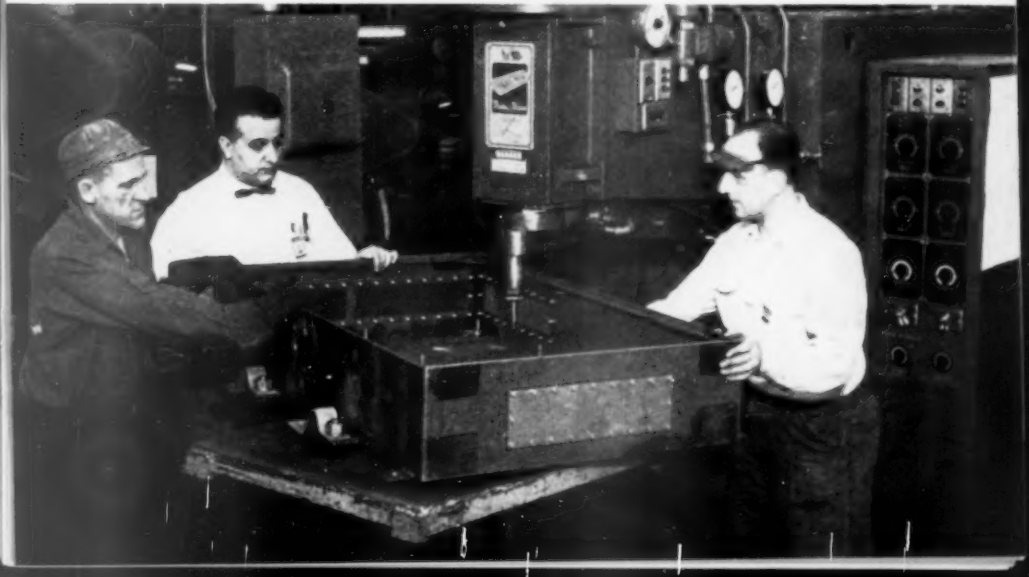
Use Two Tons of Weld Metal

Approximately two tons of electrodes and welding rods are used per month. These range in diameter from $\frac{1}{16}$ to $\frac{1}{4}$-inch. Although E 6012 electrodes comprise the bulk of these, electrodes and rods for welding stainless, low carbon and alloy steels and aluminum, brass,

(Continued on Page 80)

Welding positioner with 8-ton capacity makes it easy to weld corners on bulky upper housing.

Projection welding joins $\frac{3}{8}$-inch steel straps to power control panel. Before this operation, $\frac{1}{2}$-inch copper-coated bolts were projection welded to straps.



This NEW resin sander disc is so sharp

you can see

and feel the difference!

Circle No. 36 or Reader Service Card.

You never saw a sander disc that *looks* so sharp... *feels* so sharp... *cuts* so fast, free and cool. It's the all-new Resin Sander Disc by CARBORUNDUM.

Test it on the toughest sanding job in your shop. See how it beats any other disc — for cutting ability, long life, uniformity. Notice how the edge holds its shape longer, and how the abrasive grain stands up under the most severe grinding conditions. And you'll find it *stays* uniformly sharp, from start to finish.

WHAT'S NEW IN THESE DISCS? EVERYTHING:

The abrasive grain is an improved type; the resin bond is engineered to provide more holding power; a new and tougher fiber is used in the backing. And rigid new manufacturing controls assure highest uniformity from disc to disc, from order to order... to give you truly dependable performance.

Sander Discs by CARBORUNDUM come to you in moisture-resistant boxes to keep them "factory-fresh" and to make handling and storage easier.

FOR A FREE DEMONSTRATION...call your CARBORUNDUM Distributor or Salesman, listed in the yellow pages under "Abrasives" or "Grinding Wheels." Or write The Carborundum Company, Dept. IW 82-417, Niagara Falls, New York.

CARBORUNDUM

REGISTERED TRADE MARK

...continually putting more SENSE in your abrasive DOLLAR

82-417

Circle No. 36 on Reader Service Card.

Increased welding speeds and lower production costs are claimed for new inert arc welding process that uses coated wire electrode, improved wire feed control and constant potential power source.

New Inert Arc Welding Process Speeds Fabrication of Mild Steel

HIGHER welding speeds, better quality welds, and lower operating costs are the main advantages claimed for new consumable electrode, inert-gas are welding process developed by Westinghouse. Field tests in the new process disclose a 15 to 20 percent faster welding speed at a 25 to 50 percent reduction in costs over other methods of welding mild steel.

Key to the new process, which uses ordinary welding grade argon to shield the arc is a new coated wire, a product of 5 years research and development. This wire produces best results when used with a newly designed welding gun, wire control, and a new constant potential 500 ampere, d-c arc welder. These new components considered separately or as a unit, are said to offer many outstanding advantages in addition to increased speed at decreased cost.

The consumable electrode process has been used for several years to weld stainless steels, aluminum, and other non-ferrous metals. This new method now brings all the advantages of this process — speed, higher quality, cleaner welds—to the welding of mild steel at economical operating costs. It produces welds that can be painted without cleaning. There is virtually no spraying or spatter. Nor is there any slag-covering on the weld. The new process may be used on mild steels, with or without normal mill scale, on thick-

Mr. Jennings is Engineering Manager and Mr. Bischel, Manager of Special Products Section of Westinghouse Electric's Arc Welding Department in Buffalo, New York.

TEMPERATURE—DEGREES F	+80	0	−100	−200
YIELD POINT—PSI	63,200	81,700	90,000	109,200
TENSILE STRENGTH—PSI	76,000	92,400	100,600	111,500
ELONGATION (PERCENT OF TWO INCHES)	27.9	25.85	25.50	27.13
REDUCTION IN AREA—PERCENT	69.4	69.90	61.30	57.90
IMPACT* WEST-ING-ARC—FT LBS	100.0	80.0	22.0	
IMPACT* E 6020 MANUAL—FT LBS	58	25	21.0	
* V-NOTCH CHARPY IMPACT TEST				

Typical values are listed for various physical properties at low temperatures from 80°F to minus 200°F.

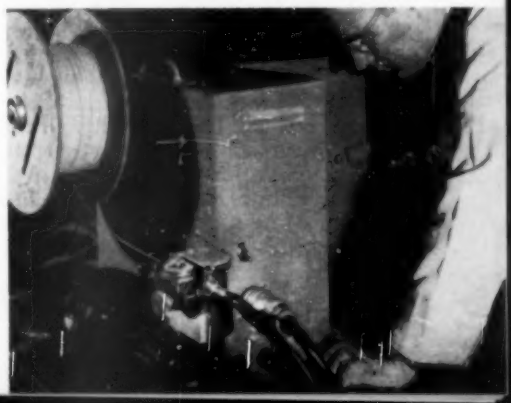
A Special Report
by
C. H. Jennings and H. J. Bischel

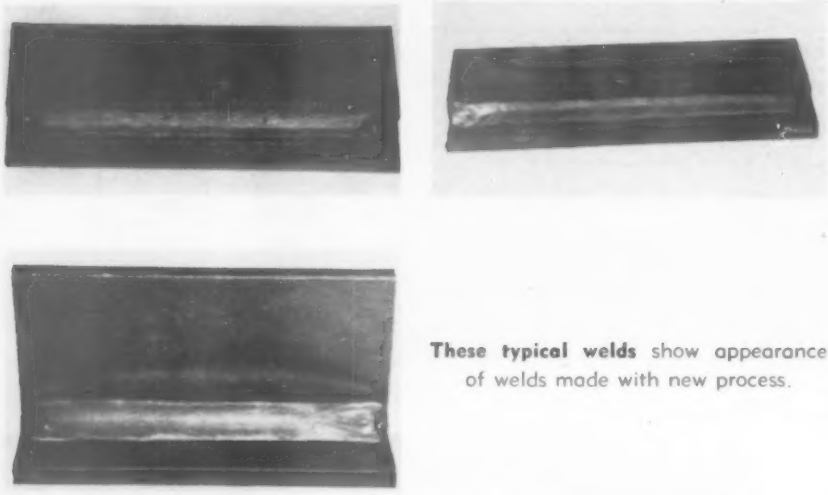
nesses from $\frac{1}{16}$ inch up. It can be used as either a semi-automatic process—where an operator holds the gun—or in automatic processes where the gun is clamped into position and the work moved or where the wire is fed through an automatic head. Primarily intended for horizontal and flat position welding, the new process is not yet developed for vertical or overhead welding.

Considering the components separately, the first major advance has been in the wire, or the consumable electrode. This wire is made of mild steel of special analysis in four sizes varying from .040 to .091 inches in diameter. Materials of definite composition are coated on the wire by means of a special manufacturing process. Although electrode coatings in general are by no means unusual, the one on the new wire virtu-

Well-balanced welding gun has smaller nozzle which reduces gas consumption and increases speed in making smaller fillet welds.

Wire is fed to gun at constant rate. Portable control is built for a minimum of maintenance.





These typical welds show appearance of welds made with new process.

ally sets the high performance standards of the new welding process. Here is why:

The amount of metal an electrode deposits—and consequently the welding speed—is determined by the burn-off rate . . . the rate at which the electrode burns for a given welding current. The burn-off rate is in turn affected by the polarity of the welding process. Using a bare wire, with straight polarity—with the electrode the negative terminal, the burn-off rate is 1.8 times that with reverse polarity—with the electrode the positive terminal. However, straight polarity with a bare wire results in poor arc stability, heavy spatter, and extremely low penetration, meaning generally unsatisfactory welds. Consequently, the higher burn-off rates of straight polarity operation are usable only if these major objections can be overcome. The new process, in contrast to most other processes of this type, uses straight polarity. The special coating on the wire makes it possible to take advantage of some of the higher burn-off rates because it stabilizes the arc, eliminates spatter, and provides good penetration. The end result is a high quality weld at greatly increased speeds.

Wire Feed Measures Weld Speed

Comparison curves of deposition rates of $\frac{1}{16}$-inch diameter wire show that the wire ranges from 15 to 22 percent faster wire feed speed depending on the welding current used. Since the arc is extremely stable and is free from wasteful spatter, the wire feed speed is a direct measure of the actual welding speed for a given size weld.

Weld appearance is excellent, penetration is good and welds are

(Turn to Page 62)

Here's a new book YOU should have

New Revised Edition of The Pocket Manual of Arc Welding

Valuable Data — the new Pocket Manual of Arc Welding contains latest welding application data of value to foremen, supervisors, inspectors and operators—in concise, easy-to-read form.

You'll use it Every Day — in your shop work. The new Pocket Manual of Arc Welding provides practical on-the-spot information on many arc welding problems. Written from the standpoint of welding supervisors and operators, it fills a longtime need in the industry.

Order Your Copies Now— Immediately available at $1.00 each. Special discounts for larger quantities. If your welding supply distributor cannot supply you, use the coupon below.

172 Interesting Pages

Written by Lew Gilbert, editor of INDUSTRY and WELDING this "down-to-earth" Pocket Manual can be used as a welding department guide as well as a text book for operator training programs. It contains a large variety of new reference data in the form of charts, diagrams, welding symbols, efficient joint details, etc.

The Industrial Publishing Group
1240 Ontario St.
Cleveland 13, Ohio

Please send me.....copies of the (POCKET MANUAL OF ARC WELDING) at $1.00 each. Check or money-order in the amount of $..... is attached.

Name .....

Address .....

City and State .....

Here's an easy way to make BIG SAVINGS on small parts

THOUSANDS OF SMALL PARTS NOW made by casting, forging or machining from the solid could be made faster and at much less cost by switching to stamped parts brazed with the low-temperature silver brazing alloys EASY-FLO and SIL-FOS. The part above is an example. Formerly an investment casting, it is now made of two stamped pieces brazed with a little piece of EASY-FLO45 wire. One girl with a jig and a gas torch turns out 800 per 8-hour shift.

CHECK your small parts and see how much you can save by changing to EASY-FLO or SIL-FOS brazed construction. We'll gladly send a field service man to help – with no obligation.

FOR FULL *EASY-FLO* AND *SIL-FOS* FACTS
write today for BULLETIN 20

HANDY & HARMAN — FOUNDED 1867 — QUALITY + SERVICE — ORIGINATORS OF EASY-FLO & SIL-FOS

HANDY & HARMAN

General Offices: 82 Fulton St., New York 38, N. Y.
DISTRIBUTORS IN PRINCIPAL CITIES

OFFICES and PLANTS
BRIDGEPORT, CONN.
PROVIDENCE, R. I.
CHICAGO, ILL.
CLEVELAND, OHIO
DETROIT, MICH.
LOS ANGELES, CALIF.
TORONTO, CANADA
MONTREAL, CANADA

Circle No. 38 on Reader Service Card.

of sound, x-ray quality.

Physical properties of the welds are superior to those obtained using either automatic or manual coated-electrode processes. Excellent physical properties at low temperatures mean a weld low in contaminating oxygen, nitrogen and hydrogen.

Stabilized Arc Cuts Costs

Better quality welds is not the only advantage of arc stabilization. In stabilizing the arc, the special coating has a very decided affect on operating costs.

One of the major costs in an inert gas welding process is the cost of the shielding gas, in this case argon. Argon normally sells for about $0.10 per cubic foot and inert gas processes now on the market use in the neighborhood of 45 cubic feet an hour. This process uses about 30 cubic feet an hour, for a savings on gas alone of about 33 percent. The reason for the lower gas usage in this: each time the arc fluctuates, air is drawn in past the inert gas shield and consequently more gas is required to prevent induction of air. When good arc stability is provided, these fluctuations are eliminated which results in the savings in inert gas.

Reduce Weld Cleaning Time

While inert gas cost is not a problem in manual welding, and the type of electrode used is less costly than that used in semi-automatic welding processes, the characteristics of the process are so inherently economical that it still results in about 25 percent less cost per inch of metal deposited over manual methods. This cost includes: time for welding, cost of materials, and time normally re-

These four cross sections illustrate quality of welds and depth of penetration.

quired for cleaning and grinding preparatory to painting.

Other Applications

There are definite types of applications where the process is expected to replace submerged arc welding—welding under a blanket of flux. In applications where flux cannot be tolerated because of a dirt hazard, for example refrigerator compressors, or where the flux cannot be held in place easily, such as small diameter circumferential welds, the new process could well supplant the submerged arc process. It may also be more applicable than submerged arc where it is desirable to see the weld or where numerous skip welds must be made. It is not expected that the new process will be applicable to present high-current submerged arc welding applications above 500 amperes.

The electrode gun—rated at 500 amperes—also incorporates many outstanding advantages. It is light in weight and exceptionally well balanced. This means that operators can weld for long periods without fatigue. No tubing is exposed on the gun, which delivers wire, power, gas and water. The tip of the gun is specially designed for high-water-cooling efficiency, meaning longer life.

Control of Wire Feed

The control for feeding the wire has been designed to supply wire at a constant pre-selected speed under all loads. Both of the drive rolls are driven through a 1/12-hp d-c gearmotor. The electrode length beyond the tip of the gun is

KILL
moisture absorption
with DESPATCH
ROD DRYING
OVENS

It's an accepted fact that certain electrodes in storage tend to gather moisture and CO2. This applies to low-hydrogen, stainless steel and non-ferrous electrodes. The amount of moisture is related not only to the percent of relative humidity, but also to the length of time that electrodes are stored. Despatch "WRD" Welding Rod Ovens provide lots of storage room in 10 spacious compartments and do a thorough, steady, dependable dehydrating job. *Specifications:* Outside dimensions—18"x19"x18". Max. Temp. 550° F; 250 lbs. rod capacity. *Write for Bulletin.*

★ For all types of baking, drying and ageing
★ Operator works steadily—rework time cut
★ Automatically controlled—set it and forget it
★ Mesh shelving for total heat circulation
★ Conveniently portable for entire shop use

DESPATCH OVEN CO.
Established in 1902
360 DESPATCH BLDG. MINNEAPOLIS 14, MINN.

Circle No. 39 on Reader Service Card.

controlled on stopping so that neither wire nor operator time is wasted by trimming. Designed for portability, the control panel is light weight and operates from a conventional 110-volt, a-c supply. An adjustable water pressure switch prevents operation of the unit when the water pressure is below a predetermined limit. Since maintenance is a key factor, all the control components are long-life devices and are made readily accessible by means of a swing out panel.

The constant potential power supply is rated 220/440-volts, 60 cycle, 3 phase. Its continuous current rating is 500 amperes at 34 volt load.

For further information on this new development, write the Editor, INDUSTRY and WELDING Magazine, 1240 Ontario St., Cleveland 13, Ohio, or Circle No. 95 on the Reader Service Card.

Fire Protection Group Approves Changes

At its recent annual meeting, the National Fire Protection Association approved certain changes in Standard No. 51 "Gas Systems for Welding and Cutting." The changes, having to do with capacities of fuel gas manifolds installed inside building and with hose, were originally recommended by the Oxy-Acetylene Committee of the International Acetylene Association, approved by the group's Executive Committee and sent to the N.F.P.A. Committee on Gases.

Portions of Standard No. 51 affected and changed are contained in revised Standard which will be available from the N.P.F.A. and N.B.F.U.

REXARC

STEP UP SERVICE WITH A

MODEL RP43

AUTOMATIC WELDER AND POSITIONER

Rebuilding rollers, idlers and other circular shapes in your shop? A Rexarc Model RP43 will speed up service to your customers.

Here's automatic welding that is really automatic! Rexarc's exclusive electrical design gives you high frequency stabilization of the welding arc and complete control over high and low voltage for different types of welding. You get fast, uniform deposit of weld metal. Operation is simple. All controls are located on one convenient instrument panel.

Investigate Rexarc's time-saving possibilities.

THE SIGHT FEED GENERATOR COMPANY

59 East Third Street

West Alexandria, Ohio, U.S.A.

Circle No. 40 on Reader Service Card.

Q: Isn't all filler metal for consumable electrode welding about the same?

A: No indeed—it's the quality of the filler metal that controls the quality of the weld.

Q: How can you be sure of getting the best electrode?

A: By insisting on Alcoa's new I.G.* Electrode.

Q: Why?

A: Every production lot of Alcoa® I.G. Electrode is test welded and the welds X-rayed for soundness. Each 10-lb spool is individually packed to maintain the super-smooth finish to assure soundness of weld and smoothness of feed. Each of three alloys, 1100, 4043 and 5154 (formerly 2S, 43S and A54S), is available in six diameters. There is no better electrode. *inert gas

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

ALUMINUM COMPANY OF AMERICA
938-L Alcoa Bldg.
Pittsburgh 19, Pa.

Gentlemen: Please send book, *Welding Alcoa Aluminum*.

Name_____

Company_____

Title_____

Address_____

City_____ State_____

A new, 176-page text, *Welding Alcoa Aluminum*, has just been released by Alcoa. It covers every phase of welding in complete detail. For a free copy, fill in and mail the coupon.

Circle No. 41 on Reader Service Card.

Q: Where is Alcoa's new I.G. Electrode available?

A: Contact your nearest Alcoa sales office, or, for immediate delivery, call one of the Alcoa Distributors listed below. He carries a complete range of alloys and sizes and you'll find him well qualified to work with your welding experts.

ALBANY, N. Y.
†Eastern Brace-Mueller-Huntley, Inc.

ATLANTA, GA.
†J. M. Tull Metal & Supply Co., Inc.

BALTIMORE, MD.
Whitehead Metal Products Co., Inc.

BIRMINGHAM, ALA.
†Hinkle Supply Co.

BOISE, IDAHO
Pacific Metal Co.

BUFFALO, N. Y.
Brace-Mueller-Huntley, Inc.
Whitehead Metal Products Co., Inc.

CAMBRIDGE, MASS.
Whitehead Metal Products Co., Inc.

CHARLOTTE, N. C.
Edgcomb Steel Co.

CHICAGO, ILL.
†Central Steel & Wire Company
†Steel Sales Corporation
Corey Steel Co.

CINCINNATI, OHIO
Williams & Co., Inc.

CLEVELAND, OHIO
†The Hamilton Steel Co.
Williams & Co., Inc.

COLUMBUS, OHIO
Williams & Co., Inc.

DALLAS, TEXAS
Metal Goods Corp.

DENVER, COLO.
Marsh Steel Corp.
Metal Goods Corp.

DETROIT, MICH.
Central Steel & Wire Co.
Steel Sales Co. of Mich.

HARRISON, N. J.
Whitehead Metal Products Co., Inc.

HOUSTON, TEXAS
Metal Goods Corp.

INDIANAPOLIS, IND.
Steel Sales Co. of Indiana, Inc.

JACKSONVILLE, FLA.
Florida Metals, Inc.

KANSAS CITY, NORTH, MO.
†Marsh Steel Corp.
Metal Goods Corp.

LOS ANGELES, CALIF.
†Ducommun Metals & Supply Co.
Pacific Metals Co., Ltd.

LOUISVILLE, KY.
Williams & Co., Inc.

MIAMI, FLA.
Florida Metals, Inc.

MILFORD, CONN.
†Edgcomb Steel of New England, Inc.

MILWAUKEE, WIS.
Central Steel & Wire Co.
Steel Sales Co. of Wis.

MINNEAPOLIS, MINN.
Steel Sales Co. of Minnesota

NASHUA, N. H.
Edgcomb Steel of New England, Inc.

NEW ORLEANS, LA.
Metal Goods Corp

NEW YORK, N. Y.
†Whitehead Metal Products Co., Inc.

PHILADELPHIA, PA.
†Edgcomb Steel Co.
Whitehead Metal Products Co., Inc.

PITTSBURGH, PA.
†Williams & Co., Inc.

PORTLAND, ORE.
†Pacific Metal Co.

ROCHESTER, N. Y.
Brace-Mueller-Huntley, Inc.

ST. LOUIS, MO.
†Metal Goods Corp.

SALT LAKE CITY, UTAH
Pacific Metals Co., Ltd.

SAN DIEGO, CALIF.
Ducommun Metals & Supply Co.

SAN FRANCISCO, CALIF.
†Pacific Metals Co., Ltd.

SEATTLE, WASH.
Pacific Metal Co.

SYRACUSE, N. Y.
†Brace-Mueller-Huntley, Inc.
Whitehead Metal Products Co., Inc.

TAMPA, FLA.
†Florida Metals, Inc.

TOLEDO, OHIO
Williams & Co., Inc.

TULSA, OKLA.
Metal Goods Corp.

YORK, PA.
Edgcomb Steel Co.

†Home Office

Circle No. 41 on Reader Service Card.

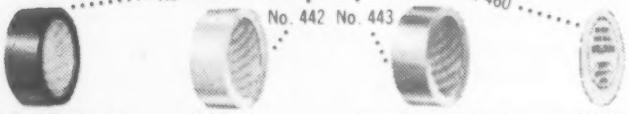
NOW.. WILLSON INTERCHANGEABLE RESPIRATORS

IN BOTH SINGLE AND DOUBLE CARTRIDGE STYLES!

NOTE: The cartridges and filter shown for use in the Series 400 single-cartridge respirator are exactly the same as those used in the Series 800 double-cartridge respirator and can be used interchangeably in both. The other five cartridges, filters, and combinations are recommended for use only in the Series 800 respirator.

Single-Cartridge Series 400

No. 441 · No. 442 · No. 443 · No. 460



#41 Cartridge for Organic Vapors (BM2308)

#42 Cartridge for Acid Gases

#43 Cartridge for Organic Vapors and Acid Gases

(BM2161) #R415 Filter for Dusts and Mists (BM2162)

#41 Cartridge and #R415 Filter for Dusts and Organic Vapors (BM2308)

#41 Cartridge and #R472 Filter for Paint Spray

#44 Cartridge for Ammonia

#R361 Filter for Metal Fumes, Dusts and Mists (BM2149)

#R436 Filter for Radioactive and Beryllium Dusts, Mists or Fumes

No. 841 · No. 841 · No. 841P · No. 842 · No. 844 · No. 843 · No. 880A · No. 860 · No. 890

Double-Cartridge Series 800

These Willson Respirators are the first truly interchangeable types in the field. Neither style requires additional parts or accessories to make use of the cartridges, filters, or combinations indicated to be used with them.

Write for bulletins describing these new Willson Interchangeable Respirators. Standardizing on them will give you the respiratory protection you want and simplify your inventory as well.

More than 300 safety products carry this famous trademark

WILLSON®

Established 1870

WILLSON PRODUCTS, INC.
223 Washington Street
Reading, Pennsylvania

Circle No. 42 on Reader Service Card.

21 WAYS TO LOWER COST OF ARC WELDING FOR PRODUCTION

by ROBERT WILSON

In the second of three important articles, the author analyzes the production of welded fabrications, listing specific ways in which welding costs can be reduced. In subsequent issues, Mr. Wilson, who is Welding Applications Engineer at Lincoln Electric Co., will cover actual welding procedures that can result in substantial cost savings.

Design and production must work closely together so that a design is created which can economically be manufactured with equipment available in a given plant. Designers may find existing production methods restricting, but acceptance of the restrictions usually result in the most economical design.

Cooperation between engineering and production should be organized so that no design is considered final until the welding and production men have gone over it to assure that its manufacture is practical.

After the product is designed, however, it is welding's job to put the product into production in the best possible way. Decisions on methods are as important as those of the designer on design in their effect on ultimate cost.

10. Choice of Process

There are other methods of welding than arc welding, and that one of these may be the most economical. Within the arc welding process, however, there is a wide selection of methods possible. The selection, of course, may be limited by already existing facilities. On the other hand, economies available with some other method may warrant the purchase of new equipment.

Both AC and DC welding current have their particular advantages. In general, AC welding will produce economies when welding in heavy plate on structures where arc blow is a deterrent to high welding speeds. Direct current has

Comparison of Manual Welding Speeds to Automatic Speeds

		Manual			Automatic		
Material	Weld	Passes	Amp.	Speed ft./hr.	Passes	Amp.	Speed ft./hr.
10 Ga.	butt	1	180	120	1	650	500
½"	butt	3	350	19	2	800	68
1"	butt	8	350	6	2	1000	32
10 Ga.	edge	1	160	200	1	600	500
10 Ga.	lap	1	200	90	1	750	400
¾"	lap	1	375	50	1	625	180

a decided advantage in its versatility and in welding sheet metal.

Where the quantity of production and the uniformity of the shape of weldments permits, automatic submerged arc welding can usually produce savings of a nature that warrant an outlay for equipment and fixtures. In some cases, automatic welding is three times as fast as manual welding. In addition, further savings will result from the automatic nature of the operation. Less metal deposited at faster rate and with greater penetration is resulted because of the high current densities employed by the process. Less distortion is encountered. There is little or no cleaning and finishing operations are easier.

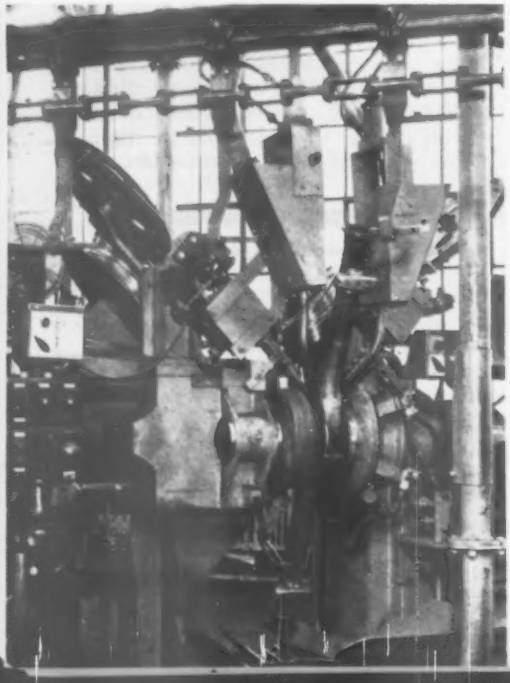
Where quantity and shape of the welding job do not warrant the expense of an automatic operation, the semi-automatic submerged arc equipment can be used to take advantage of the hidden arc process. This is equipment which can be used for either regular manual welding or submerged arc welding by hand. The electrode is automatically fed to the work through a mound of granular flux, but the direction and rate of travel of the arc is controlled by hand. Current densities used with this equipment are still higher than those used with automatic equipment and resulting speeds and quality of welds produce large savings.

11. Edge Preparation

Several choices are open in de-

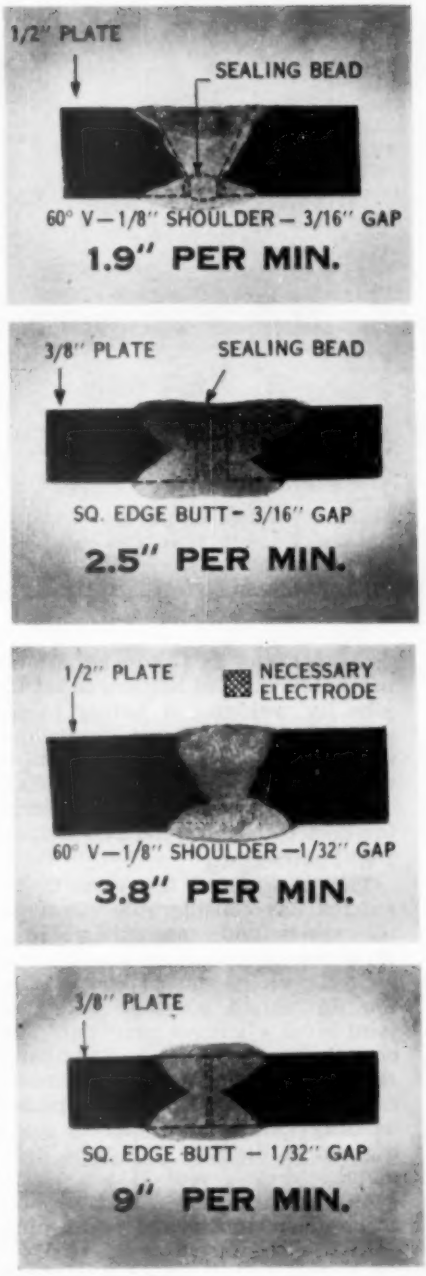
Consider submerged arc welding for . . .

. . . **completely automatic** low-cost, high speed welding when quantity of production and uniformity of weldment shape permits, or . . .



. . . **semi-automatic welding** where quantities are low and shape of weldment does not warrant the expense of an automatic operation.

These butt welds in ½-inch plate show how welding speeds are affected by joint fit-up. Wider gaps require sealing beads and more weld metal.



ciding upon how to prepare material for welding. Here, as with joint selection, the method used must be a balance between the basic costs of preparing and welding. Shearing and blanking are the most economical where they can be used. Flame cutting can be done to close tolerances with modern equipment. Machining is necessary for precision work.

12. Fit-Up

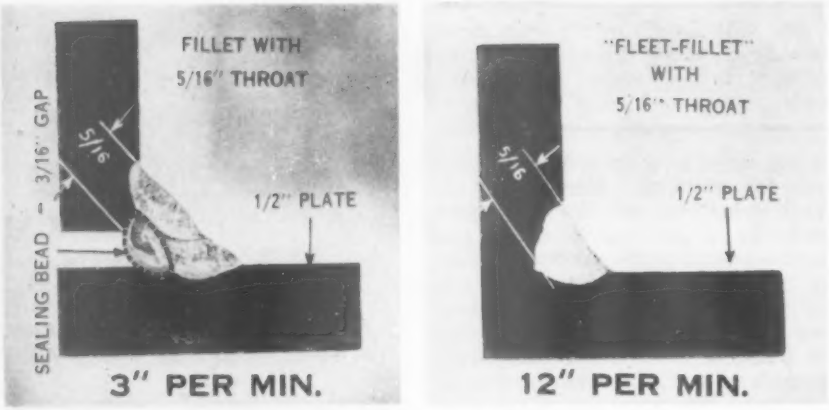
The type of edge preparation used must be selected with the importance of good fit-up in mind. Many of the economies of automatic welding are made possible because it is necessary to have a precise fit-up for automatic operation. The machine makes no allowance for variance in fit-up as does the hand operator.

If the same care is used in fitting for hand welding, astonishing cost reductions can be made.

The importance of fit-up cannot be over-emphasized as the person making the fit-up is just as responsible for low cost production as is the welder. Fit-up not only affects the cost of welding but also influences the performance of the product. It increases the amount of metal required and increases the amount of time through decreased welding speeds. A square edge butt weld on ½-inch plate when welded with a $\frac{1}{32}$-inch gap can be made more than twice as fast as the same weld with a $\frac{3}{16}$-inch gap.

13. Sub-assemblies

In planning the flow of production, time will be saved, generally, by using sub-assemblies wherever possible. This will permit easier



Fillet welds in ½-inch plate again show effect of joint fit-up on welding speeds.

access to many joints that have to be welded. It will facilitate inspection and, in some case, painting and stress relieving where this is necessary.

Sub-assemblies will also increase operating factor by allowing greater use of helpers to set up jobs for welders. A helper to set up a job in a jig, while the welder is welding in another, can double the output of the welder. One-half of the welder's output is secured at the cost of one jig and one helper.

14. Positioning

The position of the joint to be welded has considerable effect on the speed and ease of welding. With the exception of sheet metal welding, welds should be made in the downhand position with the joint level wherever practical. The change from vertical to downhand can increase the speed by as much as 400 percent. It also simplifies welding since the electrode coating can be dragged along the base metal.

The use of jigs and fixtures will accomplish much in positioning work for the fastest welding.

15. Inspection

Inspection can be a valuable aid in reducing costs. To get the best results, a weld should be inspected while it is being made. An inspector by checking on the type and size of electrode being used and the current used can insure that welds of specified quality are being made at minimum cost.

A check during or before a weld is made will tell an inspector more about the strength of a weld than will measuring the weld with a gauge. The inspector can be assured that strength requirements will be met if correct procedure specifications are followed as to:

plate preparation,
electrode size and type,
current and
surface appearance.

The foregoing suggestions are directed largely toward maintaining maximum operating factor to reduce time consumed. There are many variables, however, that affect the operating factor. The con-

(Turn to Page 74)

Die Life Increased 500%...by ***Hard-Facing***

Dies, used to shape refractory tile, last 5 times longer when hard-faced with HAYNES STELLITE alloy. The hard-faced dies last as long as 10 years—producing up to half a million tiles! The high pressures and abrasion from the dry press operation made it necessary to replace unfaced dies in less than 2 years.

There are 14 HAYNES hard-facing alloys . . . an alloy for every type of wear. Some are hard and abrasion-resistant, some are tough and shock-resistant, and some give top protection against corrosion, erosion, and heat. Use them to increase production capacity and cut maintenance costs.

Your local dealer carries a complete line of HAYNES hard-facing alloys, including: HAYNES iron and nickel-base rods, HAYNES STELLITE cobalt-base rods, and HAYSTELLITE tungsten carbide tube rods. Ask him for literature. If you don't know the location of your local dealer, write to Haynes Stellite Company a Division of Union Carbide and Carbon Corporation; Kokomo, Indiana.

See... **Your local Haynes Stellite Dealer**

or

Write... **to Haynes Stellite Company**

"Haynes," "Haynes Stellite," "Haystellite" are registered trade-marks of Union Carbide and Carbon Corporation.

Circle No. 43 on Reader Service Card.

trol of variables will depend largely on the nature of each plant's operations. There are factors, such as working conditions, which may increase or decrease operator fatigue. Method studies on welding with the purpose of establishing operating conditions of maximum efficiency will uncover some unsuspected savings.

Cleaning of work to be welded to eliminate foreign matter and cleaning of finished welds are other important variables which must be controlled.

Clean joints, especially for automatic welding, will avoid holes in welds. A little edge preparation removing grease, rust and scale may mean the saving of spending a lot of time to make repairs to rejected welds.

Supply of electrodes, electrode changing, flow of material are other problems of production which offer the opportunity to reduce time.

In December the author explains how welding procedures can save time and materials. He discusses selection and use of electrodes and welding machines.

CATERPILLAR CUTS COSTS

(Continued from Page 44)

200-220° F. just before welding.

Manual Submerged Arc Welds Increase Strength

The manual submerged arc welding process is widely used at Caterpillar. A typical example of its use is to increase strength of welds in a track-carrier support. Better control of this operation makes it easy for operators to get

If all the INDEPENDENT Acetylene CYLINDERS

we have built were filled at one time they would hold more than

60,000,000

cu. ft. of gas!

Furthermore, Independent Acetylene Cylinders hold from 5 to 10% more gas, and the uniformity of the monolithic filler insures even distribution of acetone. Oxygen storage cylinders available in 12 ft. & 20 ft. lengths; capacities 850 and 1500 cu. ft.

10 C.F. 40 C.F. 60 C.F. 100 C.F. 150 C.F. 250 C.F. 300 C.F. 340 C.F.

WE INVITE YOUR INQUIRIES

INDEPENDENT ENGINEERING COMPANY, Inc.

Manufacturers of

CONSULTING · RESEARCH · DESIGNING

CYLINDERS AND GAS PRODUCING EQUIPMENT

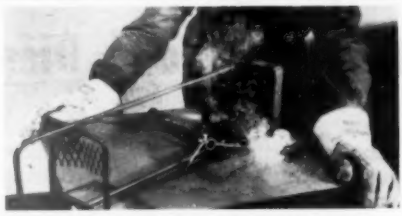
ACETYLENE · OXYGEN · HYDROGEN · NITROGEN

O'Fallon 2, Illinois

good penetration and make welds that are free from undercutting, cracking and pin-holes. Welding speeds of 12 to 14 inches per minute were equal to those previously obtained, with a gain in quality and fewer rejects.

In fabricating the assembly, a hub is first joined to the support. The weld is made in two passes. The first pass is made using $\frac{5}{64}$-inch diameter welding wire and amperages ranging from 280 to 300. The weld is lapped ¾-inch past its start to insure that it ends on solid metal. After slag is removed, a final pass is made in a similar manner, except that weld metal is deposited in an opposite direction from the first pass.

A bottom plate is then added. Here, after tacking, four inches of weld metal is deposited and cleaned of slag. Then weld is completed in one pass, starting and stopping in the four inch weld metal deposit. This is done to insure that weld starts and stops on solid base metal.



Look Ma, No Hands!

Welding without touching his work, this amateur welding operator is using a new Selfwelding method to make a piece of iron furniture. The new method, developed by the Lincoln Electric Co., is said to make welding for the amateur as easy as turning on a light switch. The method employs a special electrode, electrode holder and small AC welding machine which makes it possible for a person without experience or training to make excellent welds the first time he tries.

Circle No. 96 on Reader Service Card.

Tempilstik°

FOR ALL HEAT-DEPENDENT OPERATIONS

looks like a crayon... marks like a crayon... tells temperatures like a precision instrument!

Sixty-three different compositions enable you to determine and control working temperatures from 113° to 2000° F. TEMPILSTIK° marks on workpiece "say when" by melting at stated temperatures—plus or minus 1%.

ALSO AVAILABLE IN LIQUID AND PELLET FORM... WRITE SALES DEPT. FOR SAMPLE TEMPIL° PELLETS... STATE TEMPERATURES OF INTEREST—PLEASE!

Tempil°

CORPORATION

132 WEST 22ND STREET
NEW YORK 11, N. Y.

Circle No. 44 on Reader Service Card.

Repair of damaged alloy steel forging die was no problem when proper welding process was selected. Here's how to . . .

Use Atomic Hydrogen Welding to Repair Alloy Steel Tools and Dies

By DAN KRIZAN, Manager
Alloy Welding, Inc., Cleveland, Ohio

IN THE repair of steel molds and dies, the atomic hydrogen welding process has been used with outstanding success. Deposited metal is sound and dense and can be made to duplicate almost exactly properties of the base metal. Rapid heating and controllable depth of fusion made possible by the process are ideal for building up worn or spalled surfaces with a minimum of disturbance of the parent metal.

Our company, which uses this process regularly, specializes in the welded repair of alloy steel molds, tools and dies. Particularly adaptable to high carbon, air-hardening and oil-hardening alloy steels, the process produces welds with high corrosion resistance, high tensile strength, good ductility and excellent fatigue resistance. Because of the reducing action of hydrogen used with the process and the highly fluid condition of molten weld metal deposited, oxides and other inclusions are practically eliminated from the weld area giving much cleaner weld metal than is usual with other welding processes.

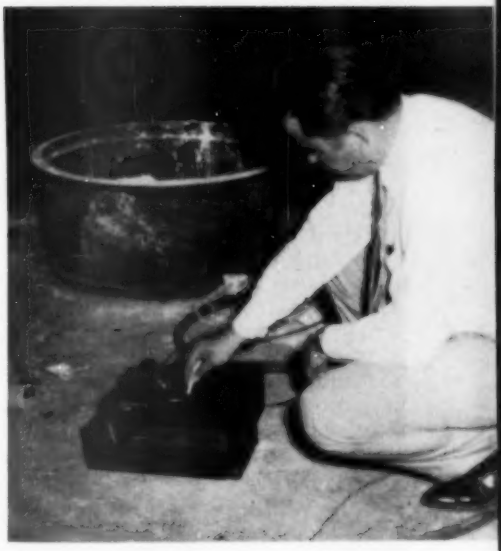
A recent example of the use of atomic hydrogen welding at Alloy

Welding was the building up of spalled areas on the face of a forging die made of Finkl FX die block steel.

There was no surface preparation necessary prior to the welded repair of this die. However, when required, grinding or machining can be used to clean up die surfaces and get down to clean base metal.

The forging die was preheated to approximately 600°F. to prevent cracking, minimize strains and prevent formation of pinholes or other defects. With the atomic hydrogen process it is possible to weld without annealing in some cases. However, if there is any doubt, it is usually best to be on the safe side and anneal a piece before it is to be welded.

In repairing molds and dies, addition of small amounts of filler metal to a comparatively large mass of base metal is frequently a requirement. Such work usually requires precautions to obtain proper heat distribution throughout the metal adjacent to the weld area. This can be obtained by preheating on all but very small pieces, or by bringing metal to the melting point slowly during welding.



Welding supervisor inspects damaged die and indicates with chalk those areas to be built up. Then . . .

Welding operator is given specific instructions on how to deposit exact amount of weld metal required.

Hydrogen Gas Shield

Welding is then started, using 3/32-inch diameter ground and polished tungsten electrodes in a regular atomic hydrogen welding torch. Peculiar to the atomic hydrogen process, the arc is maintained between two electrodes in an atmosphere of hydrogen gas and is kept entirely independent of the work or the parts being welded. The hydrogen gas is disassociated or broken down into its atomic form when the arc is struck and the temperature in the arc stream rises to approximately 11,000°F. In the process of breaking down, a large amount of heat is absorbed

Weld metal is clean, strong and ductile . . .

from the arc and is liberated on recombination of the hydrogen at the surface of the work.

The hydrogen performs several other useful functions. It is a very efficient cooling medium and, by absorbing a large amount of the heat being conducted along the electrodes from their arcing ends, which are molten, keeps the temperature of the remainder below the melting point. In the same way, it protects the molten pool and heated metal adjacent to it, reducing the tendency to surface oxidation after welding is completed.

Proper Welding Techniques

The importance of proper welding techniques and skilled operators is stressed at Alloy Welding. Although alloy steels may be welded in almost the same way as mild steel, those steels with high alloying content require less welding current. In repair of tools, dies and molds, a perfect weld is more important than speed, so no attempt is made to achieve speed in welding. The operator handling this work must be acquainted with all factors involved, and their success in welding is largely a result of their technique and experience.

In adding the filler metal, the operator plays the arc upon the work until a spot upon the surface becomes molten. Then the end of the filler rod is melted into this surface pool. The rod is then withdrawn and the deposited metal is fused into the surface of the base metal by playing the arc around the edge of the droplet until it flows into the surface.

Because available temperatures can be changed over a wide range by varying the size of the fan-shaped arc or by varying the distance between arc stream and weld surface, operators must learn to keep the arc size uniform and to keep arc proper distance from work, except where conditions warrant a change.

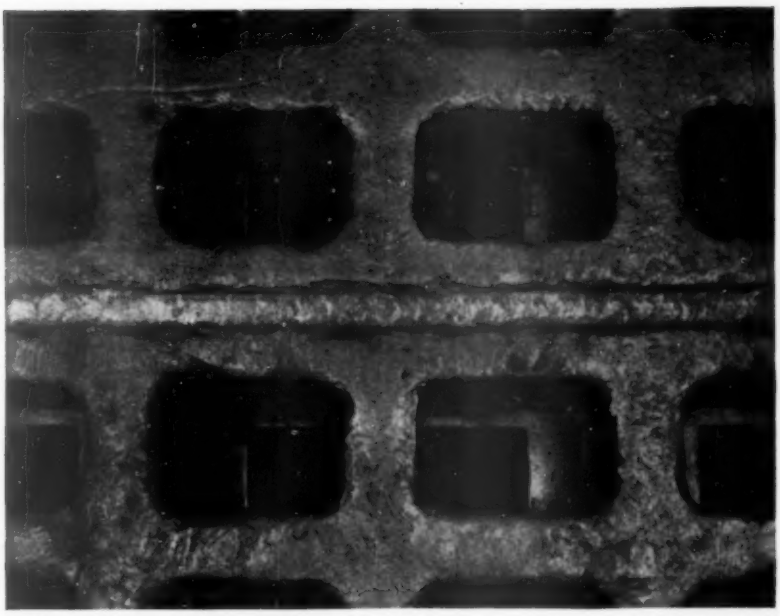
Reduce Heat When Finishing

When finishing the weld, the operator reduces the heat by drawing the arc away from the molten pool slowly. This reduces the tendency to form a crater or leave a porous spot. It prolongs the molten condition of the weld surface, thus allowing gases, which might otherwise be trapped, to escape as solidification progresses upward.

Filler metal used in the repair of the Finkl steel die was ⅛-inch diameter drill rod of the same composition as the base metal. With it the operator deposited about 1½ to 2 pounds of metal. The spalled area is built up 1/16-inch oversize so that the customer can clean it up and bring it to the proper size.

(Continued on Page 80)

Preheating prevents cracking, minimizes strains and prevents formation of pinholes or other defects.



This weld needed no preheat or postheat when made with Ni-Rod "55." It joins two 8300 lb. Ductile Iron castings which measured 6 ft. by 10 ft. by 8 in. The ten-foot joint needed only 3 passes. The castings were not stress relieved after welding.

Shake-out grate shows how strongly you can weld Ductile Iron with Ni-Rod "55"

Ten months of rough treatment and this Ductile Iron foundry shake-out has needed no repairs. Made by the Simplicity Engineering Co. of Durand, Michigan, for Beloit Foundry Co. in Beloit, Wisconsin, it is being used to shake out sand from castings as heavy as 55 tons! All welding of the Ductile Iron to itself and to the steel structure was done with Ni-Rod "55®." Despite the terrific battering the deck takes, there's no sign of welds opening up; it's crack-free. Operation of the shake-out has been quieter, too, and peening and spalling have been less than is usual with steel.

The next time you have a job of production or repair welding on Ductile Iron get *sound* welds easily with Ni-Rod "55." (It works on either A.C. or D.C.) Write today for our free folder, *Ni-Rod "55."*

The INTERNATIONAL NICKEL COMPANY, Inc.
67 Wall Street New York 5, N. Y.

INCO Welding Products

Circle No. 45 on Reader Service Card.

FREE

valuable help in improving welding results, cutting welding costs.

Low Temperature EUTECTIC WELDING ALLOYS

TIS 2241
MANUAL OF DESIGN AND WELDING ENGINEERING. 20-page digest of most useful, popular book Eutectic ever offered. Basic welding "know-how." Valuable to engineers, foremen, weldors. Suggests new, profitable uses for welding. Shows successful designs possible with "non-fusion" welding.

TIS 1010
TRUCK AND CAR FLEET MAINTENANCE MANUAL. 56 pages of pictures and text giving practical welding help on "101" automotive jobs. Tells how to salvage castings, repair shafts, transmissions, clutch and drive assemblies. Describes frame and spring repairs. Invaluable for saving time, money on body repairs and for wear resistant overlays.

All Eutectic literature is prepared from actual case histories showing how Eutectic Low Temperature Welding Alloys solve welding problems.

EUTECTIC WELDING ALLOYS CORPORATION
40-40 172 STREET • FLUSHING N. Y.

Send me the following free welding helps —

☐ TIS 2241 ☐ TIS 1010

☐ Tell your local District Engineer to show me how Eutectic can make my welding "Better, Faster, Cheaper."

NAME_____

CO ADDRESS_____

CITY_____ STATE_____

Circle No. 46 on Reader Service Card.

Analysis of the filler metal used for atomic hydrogen welding of alloy steels is usually the same as that of the parent material, except for the carbon content which should be about one-third greater to compensate for the loss of this element during welding. Of course, if the pool of weld metal is kept in a molten condition longer than normally required for good fusion, as may be necessary when welding heavy sections, or if metal is overheated, the loss of carbon tends to increase, for which further allowance must be made.

The loss of other alloying elements is negligible, unless the arc is held so long in one place that serious overheating occurs.

If drill rod of similar composition is not available, filler metal for die repair can be obtained by cutting from a piece of bar or from the die itself. This is best done by a band saw and care should be exercised to prevent decarburized steel from getting into the weld.

After welding is completed, die is postheated to 500 or 600°F. and allowed to cool in an asbestos pile.

WELDING REDUCES WEIGHT

(Continued from Page 55)

copper and other non-ferrous metals are used. Welding machines used include A-C transformer welders rated at 200 and 400 amps, and D-C selenium rectifier welders at 600 amps.

Strict Quality Control

Due to the rigid specifications under which the housing units are made, all welds are inspected during and after welding by the Quality Control Department. This de-

partment makes sure that the weld deposit is comparable or better than the base metal, that it is uniform in size and shape and that it is sound. All of these requirements call for visual, magnetic particle and x-ray inspection. Further check on quality is obtained by certifying all welding operators in accordance with Navy specifications.

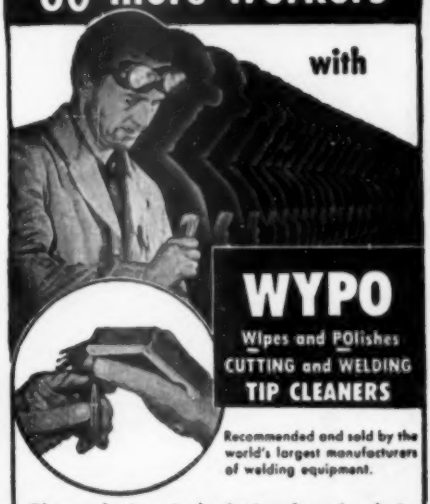
Layouts and individual pieces are checked for proper dimensions.

Spot welders of 125,000 maximum rated amperage fabricates potentiometer arm assembly. This operation joins three different metals: nickel-silver, phosphorous bronze and copper.

These dimensions are checked prior to and after machining and welding operations. Proper sequence of pre-heat, post-heat and stress relief, when required, is also checked by the Quality Control Department.

Instructions as to set-up and welding sequences are given to operators to insure ease of handling, quick and efficient set-up, control of stress and distortion and to obtain specified weld quality.

60 more workers with

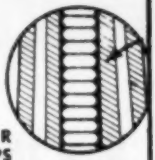


WYPO

Wipes and POlishes CUTTING and WELDING TIP CLEANERS

Recommended and sold by the world's largest manufacturers of welding equipment.

The exclusive circle design found only in Wypo Cutting and Welding Tip Cleaners provides as many as 60 more cleaning edges per inch of cleaner.



Straight sided valleys, another outstanding feature of Wypo Tip Cleaners, insures a thorough cleaning and removal of all waste.

DOUBLE THE LIFE OF YOUR WELDING AND CUTTING TIPS

Fast, easy cleaning without jamming, scratching or enlarging the tip port means added years of service to your welding and cutting tips. Only with Wypo Tip cleaners do you get thorough cleaning and polishing with one quick easy motion.

STANDARD SET OF 12 Cleans 27 Drill Sizes Nos. 75 to 49 Incl.

JUMBO SET OF 9 Cleans 19 Drill Sizes Nos. 48 to 30 Incl.

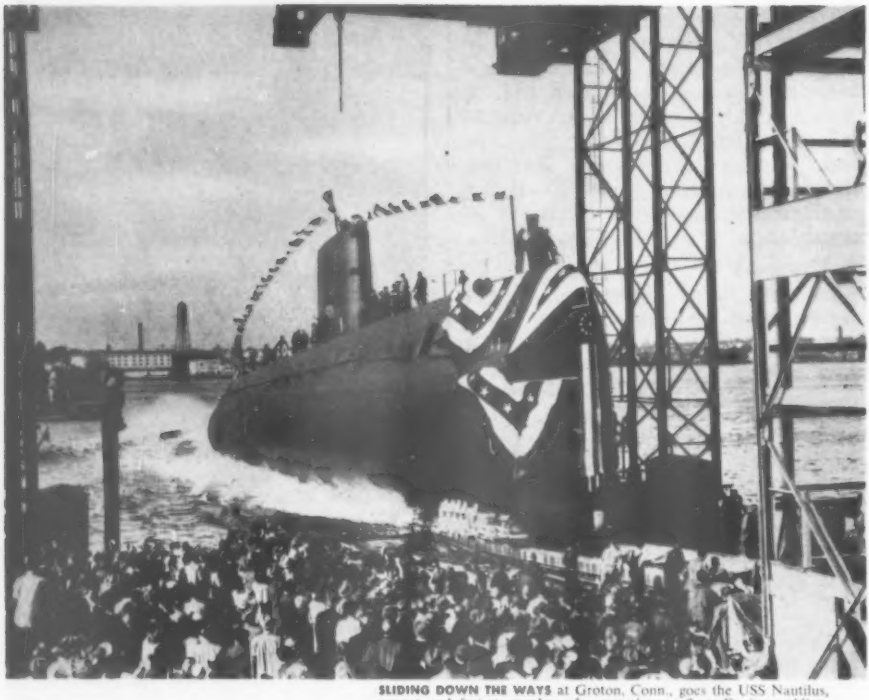
WYPO TIP CLEANERS ARE AVAILABLE AT ALL WELDING SUPPLY JOBBERS

U.S. Patent No. 2,429,581 In Canada 1948

MAITLEN AND BENSON, INC.

1395 Obispo St. Long Beach 4, Calif.

Circle No. 47 on Reader Service Card.



SLIDING DOWN THE WAYS at Groton, Conn., goes the USS Nautilus, newest and fastest member of our underseas fleet. During welding, Worthington heavy-duty turning rolls rotated the hull sections.

How the world's first atomic sub was welded

Welding the hull of the USS Nautilus, world's first atomic submarine, presented a tough problem.

Submerged-arc automatic welding seemed to be ideal for the job. Question was — could you rotate the hull sections of the Nautilus to take advantage of this fast, high-quality, welding method?

Worthington's answer to General Dynamics Corporation's Electric Boat Division, builder of the Nautilus, was the largest turning roll ever built.

The result? Welding of the Nautilus hull was accomplished in record-breaking time — and cost less than originally estimated. Unchanged, the Worthington roll set-up is also being used in the construction of the nation's second atomic sub, the USS Sea Wolf.

You can count on this kind of performance from all Worthington turning rolls and positioners. They're precision-made for tough assignments. You can also count on them to cut your welding costs and boost production. For details, write for Bulletin 228A to Worthington Corporation, Positioning Equipment Division, Section Y.4.4, Plainfield, N.J.

Y.4.4A

WORTHINGTON

Welding Positioners • Turning Rolls

Circle No. 48 on Reader Service Card.

Industry & Welding Attends a Welding Clinic

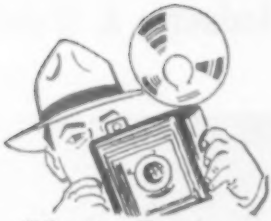


Photo Feature

HELD periodically by welding supply distributors throughout the country, the *Welding Clinic* is one of the most effective means of education in the welding industry.

Introducing the latest developments in welding by actual demonstration or through discussions by experts, these *Clinics* enable users of welding to actually see and hear about all new processes and techniques at one time under one roof.

Typical of these is the *Welding Show* held by Virginia Welding Supply Co. of Charleston, W. Va. In just three days more than 900 guests representing every facet of the welding industry viewed exhibits featuring a complete range of welding equipment and accessories.

Sound and color movies were shown on welding, brazing and weld grinding and finishing.

Free literature on all items shown or demonstrated was distributed along with various gifts and souvenirs.

Part of the crowd of over 900 who attended are looked over by Bill Rice, head of Virginia Welding Supply, and A. C. Gilbert of Jackson Products.

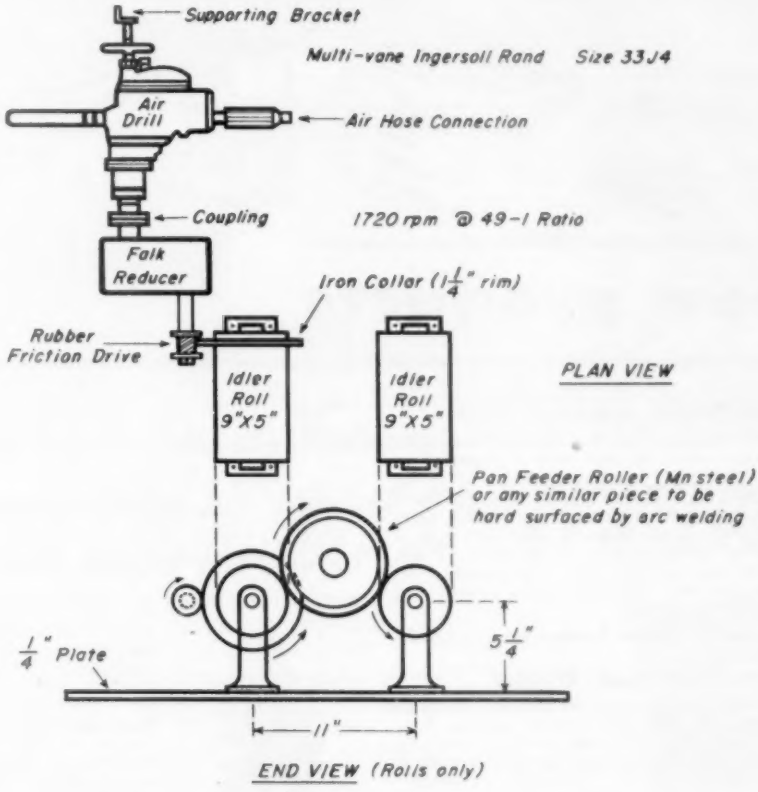
Latest developments in weld grinding and finishing are demonstrated. Educational work done here is typical of that done by many manufacturers.

Industry & Welding Attends a Welding Clinic . . .

Users of welding equipment and accessories get a chance to talk it over with representatives of manufacturers. Here, user gets the story on welding goggles and other eye and head protection devices.

Newly developed arc welding electrode is featured. Welding clinics give manufacturers a chance to introduce their products directly to potential users (below, left).

"How-to-do-it" instructions are given to users of welding by experts in various phases of welding, cutting and brazing. Submerged arc welding unit is used here with 300 amp motor generator set.

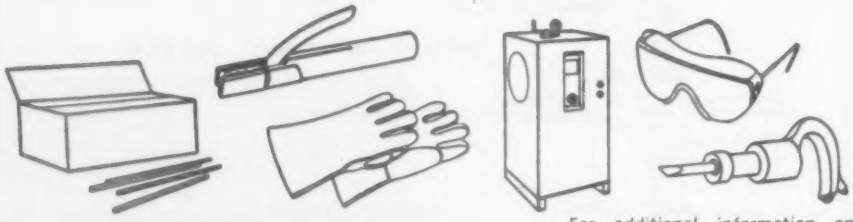


Rotating Jig Makes It Easy to Surface Cylindrical Objects

WHEN worn cylindrical object, such as pan feeder rollers, must be built up, it is a difficult job unless some jig or fixture can be rigged up to rotate the work piece at a steady rate.

The rotating device, which uses an air drill for power source, permits the operator to deposit smooth, sound weld metal on manganese steel pan feeder rollers and can be adapted for almost any cylindrical object. Welding time is also cut.

The rig is fastened to a ¼-inch thick steel plate approximately 2½-feet square.



new products

For additional information on the products appearing on this and the following pages, mark the key number of the item on the card bound into this issue. Drop the card in the mail—no postage is required.

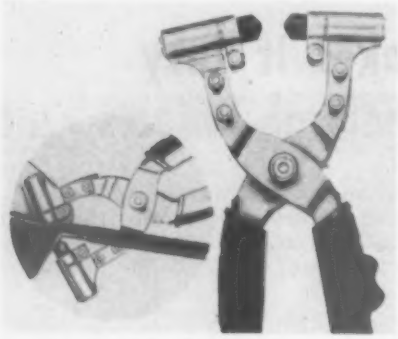
Iron Powder Electrode

Introduction of a self-cleaning iron powder electrode has been announced by the Welding Products Division of A. O. Smith Corp. Called SW-44, the electrode is claimed to deposit more E6012 weld metal than conventional electrodes. It is said to offer good washup with no undercut and smooth bead appearance with fine ripples. Manufacturer states that re-striking is easy.

Circle No. 34 on Reader Service Card.

Plier-Type Spot Welder

A new plier-type spot welder, Weldall, works off any automobile storage battery and can be used for spot welding or soldering. The unit generates 2000°F



heat and is suitable for light and some heavy work. To operate, piece to be welded is placed between two carbon electrodes which are clamped to work by plier-type action to make weld.

Made by Tip Top Electric Products Co., the unit can be used to spot weld and hard or soft solder steel, stainless steel, copper, aluminum, iron, heavy brass, bronze gold and silver.

Circle No. 120 on Reader Service Card.

Unfused Flux Recovery Unit

A new, lightweight unfused flux recovery unit, Model 230, introduced by American Vacuum Co. has slag screen for filtering out fused particles and can be arranged for continuous pick up and feed out. Flux recovery rate is 25 lbs. per minute and flux capacity is 100 lbs.

Light enough to be carried in the back of a car, the unit has brackets for quick overhead mounting.

Circle No. 121 on Reader Service Card.

Chamfering Electrode

A new thickly-coated electrode for chamfering, gouging and bevelling has been announced by All-State Welding Alloys Co., Inc. Used on A-C or D-C current, this metal-removing electrode will make a groove its own length with a top width equivalent to its own diameter. Little or no cleaning is required.

Circle No. 122 on Reader Service Card.

THE COLMONOY SPRAYWELDER

The COLMONOY Spraywelder is a metal spraying unit that applies powdered COLMONOY hard-facing alloys to almost any metal surface. The sprayed COLMONOY overlay is subsequently *welded* to the part with an oxy-acetylene flame. This important feature makes Spraywelding different from any other process.

When hard-facing with the Sprayweld Process you will:
• Cut application time • Use less alloy • Eliminate pinholes
• Require less oxy-acetylene • Reduce finishing costs.

The shaft being spraywelded is from a centrifugal pump handling corrosive chemicals. The COLMONOY No. 6 Spraywelded overlay resists corrosion and abrasion up to 21 times longer than stainless steel. Send for the Spraywelder Catalog today.

Write today for the NEW Model C Spraywelder Catalog

HARD-FACING ALLOYS

19345 JOHN R STREET **WALL COLMONOY** DETROIT 3, MICHIGAN
CORPORATION

BIRMINGHAM · BUFFALO · CHICAGO · HOUSTON · LOS ANGELES
LINDEN · MORRISVILLE · PITTSBURGH · MONTREAL · GREAT BRITAIN

Circle No. 50 on Reader Service Card.

for low-cost

PREHEATING • POST HEATING • THAWING

GENERAL HEATING • PIPE BENDING

STRAIGHTENING • LEAD MELTING

Ransome RUT Torch

with LP or natural gas

With this torch either gas produces large, hot, extremely stable flame—even in high wind. Built as hand torch; adapts with homemade brackets to stationary use. Weighs only 3¼ lbs.; 32¾" long; copper bronze head. Burns 50 minutes on 1 gal. LP-Gas at 10 p.s.i. Natural gas, minimum requirement 1 p.s.i. Order NOW... only **$14.50** f.o.b. factory. Specify whether for natural or LP-Gas.

Dealer inquiries invited. 44

RANSOME COMPANY

Liquified Petroleum Gas Division

Room L-11 4030 Hollis St., Emeryville, Calif.

Circle No. 51 on Reader Service Card.

No-Fog Chippers' Goggle

Designed to prevent lens-fogging, Model 900 chippers' goggle introduced by Pennsylvania Optical Co. provides extra ventilation directly to inner lens surfaces through slots in lens retaining rings and channels in lens seat area. This is in addition to usual perforations in side shields. Goggle also gives ventilation through wide channels between lens retaining rings and cupwalls.

Circle No. 123 on Reader Service Card.

Depressed Center Disc for Rough Weld Grinding

A new depressed center abrasive disc for rough grinding, combining increased cutting ability and safety, has been announced by Minnesota Mining and Mfg. Co. Called the 3M Type "G", the disc

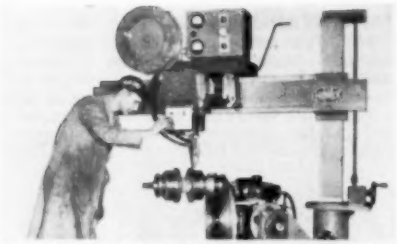
is made of aluminum oxide mineral in a reinforced fabric-and-resin construction which contributes to a faster cutting and safer operation. It is designed for heavy weld removal, slotting and portable cutoff operations. Both sides and the periphere of the disc can be used for cutting.

The new disc is available in grit 24 in two sizes — 7½ inch and 9⅛-inches—in "R" hardness. A speed of 5500 rpm is recommended for the larger size and 6000 rpm for the smaller size. Other specifications include a ⅞-inch arbor and an overall thickness of ¼-inch.

Circle No. 124 on Reader Service Card.

Roller-Idler Rebuilder

An automatic roller and idler rebuilder developed by C. B. Herrick Mfg. Corp. consists of a base, tilt table, mast and ram. The table is equipped with two spindles and cone-type tooling to self-center the rollers. These spindles engage a motor drive for variable speed rotation which is independent from the rota-



tion drive of the tilt table. Table is also equipped with a self-centering cone spindle to be used in hardfacing idler wheels. Mast supporting the ram is approximately seven feet high permitting an adjustment for vertical movement of the ram. The beam is designed to accommodate a standard travel carriage and drive mechanism.

Circle No. 125 on Reader Service Card.

High Tensile Electrode

A new electrode for welding high tensile strength joints has been announced by the Lincoln Electric Co. The new electrode, called Jetweld 2HT, contains iron powder in the coating which gives it speed and performance associated with this new type electrode. Jetweld 2HT is especially designed for high speed welding of flat fillet and deep groove joints where high tensile strength and low crack sensitivity are required. The new electrode is said to weld some butt and deep groove joints as much as 50 percent faster than conventional electrodes. It operates on either AC or DC, with AC operation recommended.

Circle No. 126 on Reader Service Card.

Industrial Vacuum Cleaner

A 7½-horsepower industrial vacuum cleaner — Model 700 — has just been introduced by the Invincible Vacuum Cleaner Mfg. Co. It is a rugged, versatile, high powered vacuum machine capable of wide and varied service. With sufficient capacity and maneuverability for oversize cleaning problems in congested areas, the Invincible "700" is suitable for pipe line installation, material conveying problems or special applications. The machine is light and compact, weighing only 550 lbs. It can be rolled easily by one man.

Circle No. 127 on Reader Service Card.

Simply Lock Onto Work

...and Start Welding!

No Other Clamp Does So *MUCH* So *EASILY!*

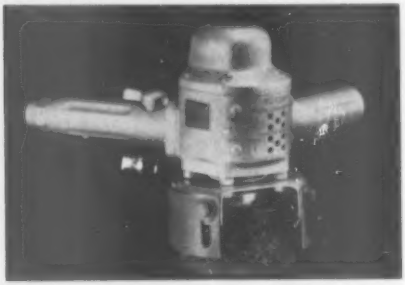
THERE IS NO SUBSTITUTE for this proven, work-saving clamp. Locks parts in perfect alignment — instantly! *No more tiresome hand gripping.* Frees both hands for work! Jaws adjust to 1⅝". You'll use it to save time — and effort — on every job. Order from your dealer. Only $2.95.

MADE ONLY BY **PETERSEN MANUFACTURING CO., Dept. IW-11, DeWitt, Nebraska**

Circle No. 52 on Reader Service Card.

Lightweight, Vertical Grinder

Rotor Tool Company has introduced a new, light weight vertical grinder for



cup wheels, cut-off wheels, sanding pads and wire brushes. Weighing only 6¾ lbs., the tool measures only 5½-inches to top of spindle washer or an overall height (including spindle) of 7-inches. Speeds of 8000, 6000 or 4500 rpm are listed and provide sufficient power for 7-inch cut-off discs, 4, 5, or 6-inch cup wheels, 5, 7 or 9-inch sanding pads. Guards for cup or cut-off wheels are standard equipment.

Circle No. 128 on Reader Service Card.

Jet Metallizing Gun

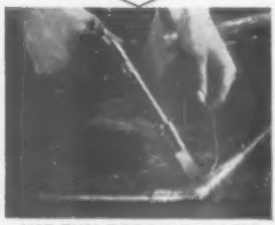
Metallizing Company of America have recently announced the new Turbo-Jet metallizing gun. This new model is said to be so flexible that one gun will take care of all spraying operations, making it ideal for production, maintenance and anti-corrosion spraying applications.

The gun may be used in a tool post or hand operated and weighs only 5½ pounds. The unit will operate on acetylene, propane or natural gas — 15 psi — and has extremely low gas and oxygen consumption.

Circle No. 129 on Reader Service Card.

Whichever Torch-o-matic you use— exclusive trigger-control saves you time, saves you fuel!

USE PROPANE?



USE THIS TORCH-O-MATIC

USE ACETYLENE?

USE THIS TORCH-O-MATIC

With either the Propane or Acetylene Torch-o-matic, you get the *exclusive* trigger-control feature that *eliminates* lighting-up, adjusting, and open-flame hazards. Just pull the trigger and it lights; release the trigger, it's out! With the Propane Torch, pulling the trigger completely back lengthens the flame from a pin-point to a full 6-inches. This *automatic* on-off flame control saves you time when you're using Torch-o-matic; saves you gas when you're not! Write for complete details on either or both Torch-o-matics.

VELOCITY POWER TOOL COMPANY 201 North Braddock Avenue Pittsburgh 8, Pa.

Circle No. 53 on Reader Service Card.

Surface Resistance Analyzer

An instrument for measuring surface resistance of metals prior to resistance Welding, the Michrohm Meter Model 151-S developed by J. W. Dice Co. checks

"cleanliness" of aluminum and other sheet material. Low surface resistance shows material is clean and should weld properly. The unit can be used to measure resistance of coupons in a test jig or the resistance of actual sheets at the welder head.

Circle No. 83 on Reader Service Card.

Low Maintenance AC Welders

A complete new industrial line of low maintenance, AC welders for high speed production has been announced by the

General Electric Company's Welding Department. Consisting of NEMA rated 300, 400 and 500 amp models, the line can be used on practically all industrial applications ranging from light-duty, low current, to heavy-duty, high current welding jobs. They are said to be especially suited for heavy section welding where high current is desirable and when arc blow would otherwise cut welding speed and quality.

Circle No. 8 on Reader Service Card.

FREE BUYERS' GUIDE

Write Wire Phone For Your Copy

PACKED WITH INFORMATION ON:

A-S Torch Welding And Brazing Alloys

24 pages of purchasing data on 39 alloys and complete range of fluxes. Bare and flux-coated rods.

A-S Arc Welding Alloys

Same catalog includes welding and cutting electrodes for ferrous and non-ferrous metals and complete range of alloy steels.

A-S Soldering & Tinning Alloys

Book also includes cast iron, stainless steel, and aluminum solders for torch and soldering iron application and galvanizing and tinning compounds.

A-S Silver Solders

Exact information is included in this book enabling user to select the particular silver alloy to do the best job at the least cost. Special silvers to solve special problems.

• All current All-State products are covered, including those recently released. This book is a buyers' guide to the complete line.

A-S DISTRIBUTORS EVERYWHERE

ALL-STATE

WELDING ALLOYS CO., INC.

WHITE PLAINS, N. Y.

Circle No. 54 on Reader Service Card.

Circle No. 55 on Reader Service Card.

Welder's Special!

GRIPSO triggermatic VISE PLIERS

COPPERPLATED FOR PROTECTION

Just as your mask and gloves protect *you*, so the copperplating protects this most valuable tool from welding spatter and from being welded to the work. The finest tool of its kind in the business. Adjusts, locks, releases, all with one hand. Clamp, hand vise, pliers, pipe and nut wrench, all in one. Holds parts securely for welding, cutting, grinding. An item every welding Jobber will want to stock. Get the whole Gripso story today. Write H. R. Basford Co., Dept. W, 235 15th St., San Francisco 3, Calif. (Warehouses Chicago, Ambler, Pa., New York City.)

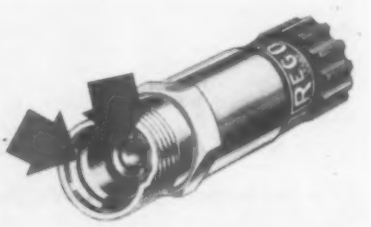
Contact-Type Hard-Surfacing Rod

The high iron powder content coated electrode produces tough sound, porosity-free welds on mild, high carbon, cast steel and manganese steel according to The Champion Rivet Co. The "drag" technique of application makes for easy, fast handling with deposition rate of about 50 per cent greater than conventional hard surfacing electrodes.

Circle No. 130 on Reader Service Card.

Neoprene Seating Rings

An improved model of the Rego "GX" welding torch features Neoprene seating rings in the seating surface of the torch head. According to the National Cylinder Gas Co., this new type seating permits



the user to make a gas-tight connection of the mixer with the torch by hand tightening, thus facilitating changing of tips. It allows hand-coupling of the Rego "KXA" cutting attachment to convert the torch to a cutting one.

Circle No. 131 on Reader Service Card.

AMERICA'S BIGGEST ARC-WELDER VALUES

Model 125A
110/220
125 Amps.
$98.50
Complete
Accessories
F.O.B. Factory

The preferred welder by those who know welding at its best. Designed and manufactured by specialists. Advanced engineering assures continuous production service eliminating work stoppage. No moving parts to wear—low operating cost—8 INDUSTRIAL MODELS range from 80 to 400 amps. Ruggedly built to meet the demands of industry.

Model 400A 220/440 400 amps continuous. $370.00 complete.

Trindl
ION TESTED ARC WELDERS

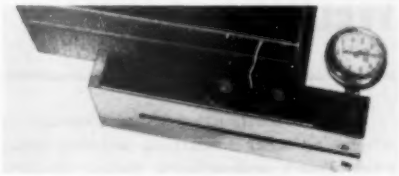
TRINDL PRODUCTS, LTD.
1807-11 S. Clark St.
Dept. T-34-L
Chicago 16, Illinois

Write for latest descriptive illustrated literature.

Circle No. 56 on Reader Service Card.

Spot Welding Tip Force Gage

A gage for accurately measuring electrode force on spot welders has been developed by Peer, Inc. Capacity of



dual range instrument is up to 3000 pounds in increments of 10 pounds. Unit is said to fill need for moderately priced instrument to measure or adjust tip force on resistance welders.

Circle No. 132 on Reader Service Card.

Welding Magnifying Lens

Welding operators using bifocal prescription glasses complain that they derive no benefit from the lower "near seeing" section of their glasses. The front section of the welding helmet is naturally away from the face. When the operator tries to use the lower section of his glasses, he looks right into the pitch darkness of the inside of the helmet.

To remedy this condition, the Sellstrom Mfg. Co. now offers magnifying glass in four strengths: 1, 1.5, 2.5, and 3 diopter. The glasses are 2-inches by 2 1/6-inches, thus a separate glass is used for each eye. This glass is intended to increase the seeing power of the upper section of the bifocals. Glasses are placed in back of the welding plate.

Circle No. 133 on Reader Service Card.

WHEN YOU WELD CAST IRON SELECT THE CORRECT

Fuse-Well

CAST IRON WELDING RODS OR ELECTRODES

FUSE-WELL NO. 11

FUSE-WELL No. 11, *Square*—Gray Cast Iron Welding Rod for Acetylene use in filling or building up new or worn castings producing machineable welds.

FUSE-WELL NO. 12

FUSE-WELL No. 12, *Round*—Has the same uses and analytical ingredients as Fuse-Well No. 11.

FUSE-WELL NO. 14 MOLY

FUSE-WELL No. 14, *Moly*—An Iron Base Rod with alloys added for finer grain structure and greater strength.

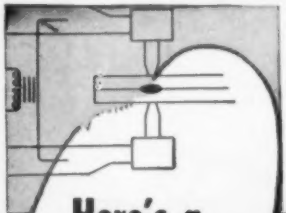
FUSE-WELL NO. 22

FUSE-WELL No. 22, *Electrode* — Light coated Rod to be used for AC or DC welding in the fabricating and repairing of cast iron castings.

Sold through Leading Distributors

THE CHICAGO HARDWARE FOUNDRY CO.
Weld Rod Division
NORTH CHICAGO, ILLINOIS

Circle No. 57 on Reader Service Card.



Here's a Money-Saving TIP

...for cleaner, sounder welds —less downtime —increased production

Use AMPCO WELD® Spot-welding Tips

Get tough with your spot-welding costs. Reduce downtime, get longer runs — use Ampco Weld spot-welding tips. These electrodes have unusual resistance to mushrooming and wear. They have high electrical conductivity, too—they stay cooler, don't stick to the work.

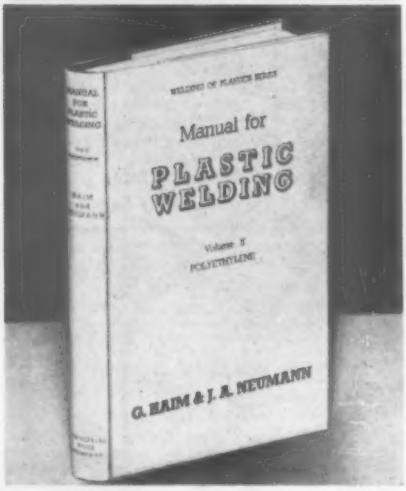
That's why Ampco Weld resistance-welding tips require far fewer dressings, stay on the job longer, save you money because of fewer shutdowns. Order Ampco tips today — and step up your production for lower costs.

®Reg. U. S. Pat. Off.

Ampco Metal, Inc. IW-88
Dept. IW-11, Milwaukee 46, Wis.
West Coast Plant, Burbank, Calif.

Circle No. 58 on Reader Service Card.

PLASTIC WELDING



VALUABLE NEW DATA

During the last few years gas welding of plastics has been applied with particular success to a large and ever-increasing variety of constructions where it has proved invaluable. Information on this subject is rather scarce. This manual will be extremely valuable to practical welding people and to engineers who intend to incorporate plastic materials into their designs.

PRICE $6.00

Industry & Welding

1240 ONTARIO STREET
CLEVELAND 13, OHIO

MORE ABOUT WELDING CODES

"You can stir up a lot of controversy when you start discussing welding codes and what's wrong with them, if anything."

That's the lead paragraph from the article "Are Welding Codes Too Strict?" which appeared in INDUSTRY & WELDING for October, 1954. And it certainly was an understatement.

Both Sides of Question

We wanted to give our readers a chance to decide for themselves, so we presented a letter by James F. Lincoln, chairman of the Board, Lincoln Electric Co., and one by C. L. Keene, vice president of Mutual Boiler and Machinery Insurance Co.

Mr. Lincoln said codes have not been engineered wisely, being too strict, contradictory and unfair. Mr. Keene thought that various codes and regulations maintain necessary quality and are constantly revised in light of additional information.

What Our Readers Think

Since the article appeared, we've had a score or more letters on the subject. Most of them agreed with Mr. Lincoln, but that can be expected since most of the 36,000 readers are welding people rather than inspection people.

The view of many of these readers is summed up in the accompanying letter which we received from Mr. Lincoln.

We're going to let it go at that, unless some of our readers want to carry the point further.

THE LINCOLN ELECTRIC COMPANY

"SHIELD ARC" WELDERS · "FLEETWELD" ELECTRODES · WELDING SUPPLIES · SPECIAL ELECTRICAL MACHINERY

22801 ST. CLAIR AVENUE
CLEVELAND 17, OHIO

Mr. Lew Gilbert, Executive Editor
Industry and Welding
1240 Ontario Street
Cleveland 13, Ohio
My Dear Sir:

In your publication of October, 1954, there is a letter from the Mutual Boiler and Machinery Insurance Company, signed by Mr. C. L. Keene, rehashing the criticisms which certain inspectors are continually urging against welding. Mr. Keene has not added anything to what other inspectors have said, nor are his statements any less inaccurate.

It may be well to compare the reaction of inspectors such as Mr. Keene to a welded joint and a riveted joint. A welded joint which did not have 100 percent strength because it was not the full plate section would be rejected. No riveted joint can possibly be as strong as the plates joined.

If porosity can be found in a weld by x-ray or otherwise, it is rejected. Every riveted joint has relatively great voids between the rivet hole and the rivet. Such joints are accepted without question.

Undercut is necessary in any tight riveted joint. The same undercut in a welded joint would be rejected.

The surface of a welded joint is relatively smooth. If it faintly resembled the roughness of a riveted joint, it would be rejected.

The inspection of welds, as done by organizations such as Mr. Keene's, x-ray costs alone are more than the cost of welding, yet there has never been a weld failure in an insured welded vessel. There have been many failures of riveted vessels.

It is not unusual for any step forward in the engineering profession to be resisted almost to the death by those who live in the past. Every forward step that has ever been taken by man has been so resisted. This was true of Christianity, of bathtubs, railroads, automobiles and airplanes, to mention a few. It is not surprising that welding, therefore, which is a tremendous step forward in joining metals should be so resisted. If, however, we stop progress, we will find ourselves beaten by the forward-looking industries of foreign countries which we are now seeing.

(Please Turn Page)

Any statement that a riveted joint has advantages over a welded joint, outside of the fact that it has been made longer, is untrue. Any statement that porosity in a riveted joint does not exist is not true. Any statement that a riveted joint will stand up against any normal use better than a welded joint, because of strength, ductility, undercutting or any other feature, is untrue. The statement that a weld in a plate can be broken by hand is untrue.

We eliminate by cost of inspection and benighted regulations the welding of buildings and many other structures that would save billions. We accept without any such inspection automobiles, trucks, railroad cars and many other devices that are inherently many times more dangerous to life if failure should occur.

The problem we face is, how long do we have to wait before we can use the better, more efficient and cheaper method that welding is? Must progress be made only by funerals?

Very truly yours,
J. F. LINCOLN
Chairman of the Board

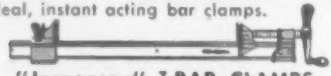
practical for severe service in **WELDING**

"Jorgensen" and "Pony" **CLAMPS**

SHIELDED against spatter

Furnished with All Steel Shield, protecting screw threads from spatter, dirt, heat, rough usage. Cost no more. Last longer.

"Pony" CLAMP FIXTURES mount on ordinary black pipe — make ideal, instant acting bar clamps.



"Jorgensen" I-BAR CLAMPS

Strongest, for hard welding service. Instantly adjusted for faster operation. A real improvement over older types.

Send for NEW CATALOG

ADJUSTABLE CLAMP CO.

419 No. Ashland Ave., Chicago 22, Ill.

Circle No. 59 on Reader Service Card.

BECKER

CARBON WELDER BRUSHES

for all types and makes of welding equipment

Everything you need from *one* source, with *one* responsibility. The fast, economical way to order. Catalog gives complete specifications, factory numbers, scaled drawings, etc. Write for your free copy today.

WHOLESALERS:
Some Distributorships still open. Write for information.

BECKER BROTHERS CARBON CO.

3450 SO. LARAMIE AVE. • CICERO 50, ILL.

Circle No. 60 on Reader Service Card.

Bay State Appoints Two Abrasive Engineers

James W. Frederick has been appointed an Abrasive Engineer for Bay State Abrasive Products Co., Westboro, Mass. He has been

Frederick

Rudolph

assigned to the Detroit, Michigan area, with headquarters at Bay State's Detroit branch office and warehouse.

William R. Rudolph has been appointed an Abrasive Engineer for Bay State Abrasive Products Co. Rudolph has been assigned to the Missouri, Kansas and southern Illinois area, with headquarters at Bay State's Chicago branch office.

Circle No. 61 on Reader Service Card.

In Women or Welding Helmets

It's the shape that counts

Get an ANGLE-SHAPED HUNTSMAN HELMET for

- Easier work "in close"
- Reducing glare from behind
- Easy fit in your tool box
- Scientific upward ventilation
- Better top-of-head protection
- Front corners don't wear through

WRITE FOR LITERATURE

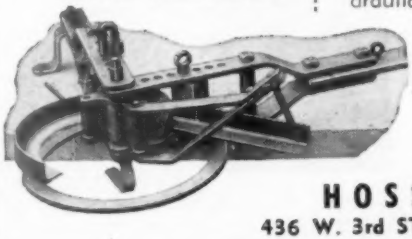
Ask Your Welding Foreman to get you a

HUNTSMAN

WELDING HELMETS, FACE SHIELDS, ACCESSORIES
Kodman Co. - 233 S. 5th W. - Salt Lake City, Utah

HOSSFELD No. 2 **UNIVERSAL® IRON BENDER**

ONE MAN . . .
ONE BENDER



Bends rounds, pipe, flats, conduit, squares, tubing, angle iron flange in or out. Hydraulic Attachment (optional) available for those tough, hard-to-pull bends on heavier material . . . fits any Hossfeld No. 2 Bender.

WRITE FOR INFORMATION.

HOSSFELD MFG. CO.
436 W. 3rd STREET • WINONA, MINN.

Circle No. 62 on Reader Service Card.

NEWS of the WELDING INDUSTRY

Pfeil Represents Tipaloy in Northeastern Ohio

Well known in the welding industry in general and in northern Ohio in particular, C. William Pfeil has been appointed sales representative for Tipaloy, Inc., in northeastern Ohio, according to H. S. Radcliff. A mechanical engineer with experience in development of special fixture and electrical controls for resistance welding, Mr. Pfeil will make his headquarters in Cleveland and cover 13 northeastern Ohio counties.

Universal Welding Supply Buys New Building

To provide necessary space for expansion Universal Welding Supply Co. of Chicago has purchased a 13,000 square foot building in New Lenox, Illinois, a suburb south of Chicago. The new headquarters will provide working space, shipping and receiving areas, parking and storage space for the company's welding supply distributing business as well as its manufacturing division, Oxo Welding Equipment Co.

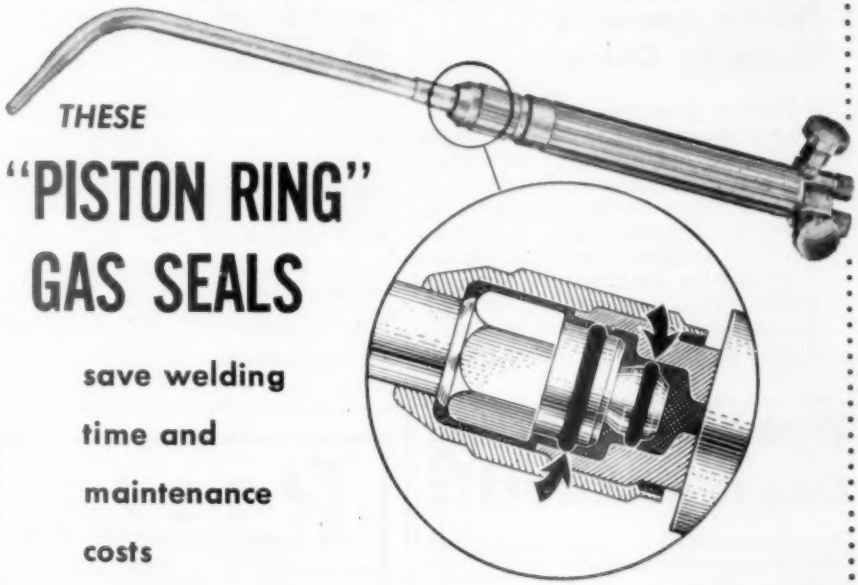
Resistance Welding Film Available from R.W.M.A.

Resistance Welder Manufacturers' Association, 1900 Arch St., Philadelphia 3, Penna., has announced addition to their film library of "Resistance Welding of Stainless Steels", which is available for schools, universities and plants for scheduled showings.

The 16 mm sound and color film runs for 21 minutes and features step-by-step resistance welding operations, including preparation for welding, different weld joints available and precautions to be observed to insure quality welds.

Staiger Represents Weldaloy

James A. O'Grady, president of Weldaloy Products Company, East Detroit, recently announced the appointment of George W. Staiger as a sales representative. Making his headquarters in Cleveland, Staiger will cover all of Ohio and Western Pennsylvania. He will assist manufacturers, metal fabricators, and distributors in resistance welding applications.



THESE

"PISTON RING" GAS SEALS

save welding time and maintenance costs

You get perfect gas seals instantly everytime you slip a welding head or cutting attachment into one of the new PREST-O-WELD blowpipes. Rubber "O" rings thrust outward like piston rings to seal without excessive pressure.

In PREST-O-WELD equipment, the "O" rings are never mashed out of shape. They last longer, give extra trouble-free service, and are easily replaced. There are no metal-to-metal seals to maintain. And because the connection nut merely locks the head into position, it needs only hand-tightening. The welding head can be rotated as desired while the flame is burning.

Ask your LINDE jobber for a demonstration today or write for more details. LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 E. 42nd St., New York 17, N. Y.

PREST-O-WELD
Trade-Mark
Welding Apparatus

•

get it from your LINDE JOBBER

The terms "Linde" and "Prest-O-Weld" are registered trade-marks of Union Carbide and Carbon Corporation.

Circle No. 63 on Reader Service Card.

Norton Announces Personnel Changes

Norton Company of Worcester, Mass., announces several changes among its outside sales personnel. Charles M. Wellons, formerly a field engineer at the Philadelphia district office, has been named an abrasive engineer and will be responsible for the territory formerly handled by the late A. Watson Gough. Robert C. Divoll, formerly a field engineer in Pittsburgh has been appointed an abrasive engineer responsible for part of the Pittsburgh territory. Charles R. Garfield has been appointed a field engineer at the Pittsburgh District Office.

William J. Mahan has been named field engineer for Abrasive Grain applications in New England (except for Connecticut), and upper New York state. Joseph F. Hartl has been made a sales engineer of abrasive grain for the State of Connecticut.

When it Comes to Welding Come to MARQUETTE

For **all** your needs . . . Marquette offers the newest, most **complete** line in the industry today:

Utility AC Welders—2 Models
New "Instant Arc"—the only fully "dead Cabinet" AC Welders — 4 Models
AND NOW
Heavy Duty Industrial AC Welders—6 Models
Rectifier Type DC Welders—5 Models
Gas Driven AC Welder and Power Plant Combinations—2 Models
Welding electrodes for all applications
Oxy-Acetylene Welding and Cutting apparatus
Welding Accessories, Fluxes and Supplies

Made RIGHT by Marquette to Work BEST for You!

MARQUETTE

MARQUETTE MANUFACTURING CO., INC.
307 E. Hennepin Ave., Dept. IEN, Minneapolis 15, Minn.

Circle No. 64 on Reader Service Card.

REEVES
REG · U · S · PAT · OFF

FIRE-CHIEF
Treated Welding Curtains
CONFINE YOUR DANGER

A close woven canvas, weighing 10 ounces per square yard before treatment, impregnated with Hooper's Fire Chief treatment under their patent which carries the Underwriters Laboratory seal.

"IF IT'S MADE OF CANVAS, WE MAKE IT"

A. SMITH & SON, INC.
GREEN & RIDGE AVE. • PHILADELPHIA 23, PA.

Circle No. 65 on Reader Service Card.

Rotor Tool Appoints Vanderpool Sales Manager

Charles E. Vanderpool has been promoted to the position of Sales Manager for the Rotor Tool Company of Cleveland, manufacturers of portable pneumatic and high cycle electric tools. Vanderpool joined the company in 1947 as Sales Promotion and Advertising Manager. Prior to his joining Rotor, he was sales manager of the Cleveland Pneumatic Tool Company.

Wedereit Re-elected NIAA Research Head

Gene Wedereit has been re-elected chairman of the board of trustees of the National Industrial Advertisers Association's Research Institute. Mr. Wedereit is director of advertising of the Girdler Company and Tube Turns, Louisville, divisions of the National Cylinder Gas Company, Chicago.

Circle No. 66 on Reader Service Card.

Rebuild MORE WORN HAMMERMILL HAMMERS IN LESS TIME!

USE MANGANAL

TRADE MARK REG. U. S. PAT. OFF.

11% - 13½% Manganese-Nickel Steel SQUARE APPLICATOR BARS

WRITE for complimentary copy of MANGANAL MARKETER showing additional applications.

STULZ-SICKLES CO.
SOLE PRODUCERS
95 N. J. Railroad Ave., Newark 5, New Jersey

ANOTHER FIRST BY CARLSON!

A WELDER'S RULE with LENGTH TO SPARE!

CARLSON Super Chief 16 FEET LONG

⅝" WIDE WHITE BLADE

Here's a long, long, wide white blade in a compact pocket-size package, designed with the welder in mind. 6-feet longer than any rule now available, the Carlson Super Chief is extra long for extra convenience in one-man measuring. With the new, functional Super Chief, one-man measuring is easier, by far

It's a Welder's rule—with length to spare. Order yours from your hardware dealer or supplier.

Less Apt to Burn: Handy re-wind crank moves the 16-ft. blade smoothly in or out of case—without backlash—to protect blade from torches.
Quick Blade Change: Change to new blade in 10 seconds—without opening the case.
Easy-to-Read: Jet black numerals on new, wider snow-white blade won't surface crack or peel.
Converts Feet to Inches at a Glance: Double graduations show both feet and inches on full length of blade.
Patented Swing-Tip: For easier, quicker inside and butt-end measurements.

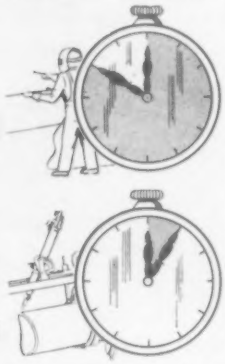
CARLSON & SULLIVAN, INC.
MONROVIA, CALIFORNIA

Produced under Patents 2089209, 2510939, 2629180 & Pat Pend.

Circle No. 67 on Reader Service Card.

Circle No. 68 on Reader Service Card.

Save
THE TIME
COUNT THE
Money!



90% TIME SAVING ON ALL PIPE SHAPE-CUTTING

Reports from welders all over the country back the claim that "H and M Shape-Cutter and Beveler saves at least 90% of the time spent hand-cutting Ells, Tees, Y's, Saddles, etc." Minutes saved mean more profit dollars.

When it comes time for those pipe fabrication contracts to be let, you'll be in a lot better position too.

Here are the simple A, B, C's of the H and M: (a) Mount desired pattern on your H and M Cutter; (b) Slip the split, horseshoe-shaped gear over the pipe; (c) Snap the machine in place with the spring-tension chain fasteners; (d) Light and adjust torch; (e) Give the hand crank a few turns — that's all there is to it. For details, write today for your free folder, "More Profit Dollars", to —

H&M PIPE BEVELING MACHINE CO.

311 E. 3rd St., Ph. 3-0241, TULSA, OKLA.

West Heads Torit

Election of William L. West as President of Torit Manufacturing Co., St. Paul, has been announced by the Board of Directors. Mr. West succeeds Edward J. Girk, who will return to the office of Vice President and Sales Manager. Other officers elected were Lawrence F. Koering, treasurer, and George A. Huna, secretary.

Miller Establishes Southeastern Region

Miller Electric Manufacturing Company, Inc. has set up a Southeastern Region to give better service to customers and distributors in all states east of the Mississippi and south of the Ohio River, including Southern Ohio and the Eastern and Southern parts of Indiana. Three men have been delegated to cover this region.

IMPORTANT EMPLOYMENT OPPORTUNITY

Excellent opportunity for ambitious, capable welding engineer, foreman or supervisor. National magazine, published in Cleveland, Ohio, needs an Associate Editor with knowledge of welding processes, ability to write intelligent reports and average typing know-how.

Good salary, pleasant working conditions, all employment benefits and interesting future. Send brief resume of educational, technical and/or practical experience to Box IW, Industrial Publishing Group, 1240 Ontario St., Cleveland 13, Ohio.

Charles L. Malott of Nashville, Tennessee is the Regional Manager, while Fred Beck of Richmond, Indiana, and Harold Bower of Atlanta, Georgia are District Managers.

Heads Industrial New Orleans Plant Air Products

John P. Caluwaert has been appointed manager of Industrial Air Products of the South with headquarters in New Orleans, according to an announcement by Gilbert Schnitzer, president of the firm. Mr. Caluwaert has been with Industrial Air Products since 1944. He was formerly assistant sales manager of the company's Portland office. Mr. Caluwaert has years of experience in the welding industry.

Circle No. 69 on Reader Service Card.

Notch 12 PIPE ENDS PER MINUTE

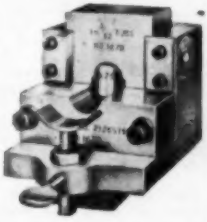
Make Perfect Joints for Welding or Brazing

ARC-FIT NOTCHES CLEAN NO FINISHING

Standard ARC-FIT in hand or power press shears contours for "T" joints for ½" to 2" pipe or tubing with easily interchanged dies.

Special ARC-FITS for larger sizes, angles other than 90°, slotting or notching square pipes, angle iron or flat stock.

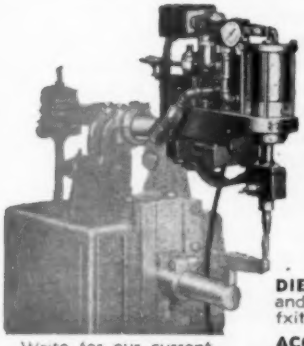
Standard Arc-Fit works well in our special HAND PRESS



Send for descriptive bulletin

VOGEL TOOL & DIE CORPORATION

1819 N. 32nd AVE. • MELROSE PARK, ILL.



Write for our current available Welder List

Solve Your Welding Problems at HOFFMAN-CHICAGO

Spot, Butt, Seam, Gun, Flash, Projection, Multi-Point and Stud Welders

NEW • USED • REBUILT

← WELD-AIR-MATIC Spot welder air conversion unit. Tests prove 10,000 welds hourly on continuous daily schedules.

BUTT-ON-SPOT → Automatic butt welding attachment. Water - cooled, fits any spot welder with minimum horn clearance of 7".

DIES: complete facilities to design and build special welding dies and fxitures for your piece parts.

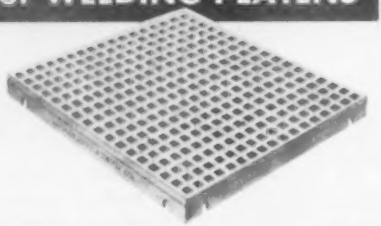
ACCESSORIES: complete stock of Welder Controls, Holders, Tips, and Bar Stock.

ROBT. W. HOFFMAN CO., INC. 38 South Clinton Street, Chicago 6, Illinois

Circle No. 70 on Reader Service Card.

Circle No. 71 on Reader Service Card.

BENDING BLOCKS or WELDING PLATENS



5 ft. by 5 ft. by 5½ in. cast steel blocks for layout, welding and assembly. Write today for information. Other sizes. Tools, stands & accessories.

ACORN IRON & SUPPLY CO.
Delaware Ave. & Poplar St., Philadelphia 23, Pa.

"Fast Fix"
REPAIR WELDING HOSE on-the-job

The "Fast Fix" kit saves time, money; provides all parts and tools needed to repair or splice cutting and welding hose on-the-job. Finished work good as original. (Cable repair kits also available).

Write for free literature!

GAS ARC SUPPLY
223 N. 16th Street, Philadelphia 2, Pa.
Circle No. 72 on Reader Service Card.

Industry's Fastest Selling
CYLINDER TRUCKS

Many Styles For all Sizes of Cylinders

LT-200

Write for full Information

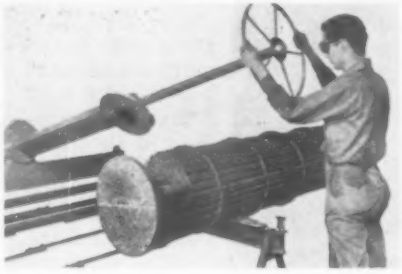
KC-50

Welded Truck & Specialty Co.
1306 DIVERSEY PKWY • CHICAGO 14, ILLINOIS
SOLD ONLY THRU "INDEPENDENT DEALERS"

Circle No. 73 on Reader Service Card.

"Slicer" Removes Tubes From Heat Exchangers And Condensers

To facilitate retubing of condensers and heat exchanger coils, Ohmstede Machine Works of Beaumont, Texas, have developed a machine called the Ohmstede Bundle Slicer. An abrasive cut-off wheel mounted on a long, movable arm cuts through worn out tubes to be replaced. One man using this machine can remove tubes in an hour and a half, where the same job using conventional methods takes two men one or more days.



The cutting wheel is a reinforced resinoid type wheel, especially designed and made for Ohmstede by Norton Company. The machine manufacturer is the sole agent for these special wheels.

As an example of its fast cutting action, 1,000 ¾-inch Admiralty metal tubes in a bundle can be cut in about an hour and a half. Although primarily designed for non-ferrous tubes, the machine works equally well on steel tubing. There is no danger of fire when cutting non-ferrous tubing because of the absence of sparks or open flames.

Circle No. 97 on Reader Service Card For More Information.

SEE PAGE 12 FOR VALUABLE FREE LITERATURE AVAILABLE

Coyne Cylinder Completes New Memphis Plant

Completion of a new $150,000 plant at Memphis, Tennessee for the Coyne Cylinder Co. of San Francisco was announced by J. P. Coyne, company president. The building covers 28,000 sq. ft., and will house both production facilities and offices. L. W. Fleischer, general manager of the firm has been named to direct sales and manufacturing operations of the new plant.

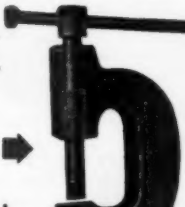
Oxweld Railroad Service Combines with Linde

Union Carbide and Carbon Corporation has announced that its Oxweld Railroad Service Division has combined with Linde Air Products Company, which has formed a new Railroad Department. This new department will conduct the business that was formerly handled by Oxweld.

K. I. Thompson, formerly vice-president in charge of sales for Oxweld, is now Manager of the new Railroad Department.

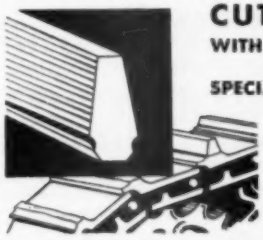
SEE PAGE 12 FOR VALUABLE FREE LITERATURE AVAILABLE

'Red Head'
WELDING CLAMPS
No Threads to Damage
DESIGNED for WELDING
• Threads never exposed
• Solid plate body
CHICAGO BOILER COMPANY
1971 CLYBOURN, CHICAGO 14, ILL.



Circle No. 76 on Reader Service Card.

Circle No. 74 on Reader Service Card.



CUT COSTS WITH Grip-Lug
SPECIAL SHAPE Tractor Grouser Retreads for faster, safer, better—lower cost welding. Bull Dog products • • •
• Lower maintenance costs
• Increase tractor efficiency
• Save expensive down-time.
Selected dealer territories available. Write for details.
Allied Steel & Tractor Products, Inc.
7835 BROADWAY • CLEVELAND 5, OHIO

miller
Electrically Controlled TUNGSTEN ARC WELDERS have Unitran
Get the facts on them today!
Miller Electric Manufacturing Company
Appleton, Wisconsin

Circle No. 18 on Reader Service Card.

Non-Toxic, Smokeless Welding Fluid
NO SPAT eliminates slow, costly grinding, chipping, cleaning of weldments, keeps welding jigs spatter-free. Suppresses fumes; no carbon monoxide. Prevents rust, conditions metal surfaces for painting. Ready to use. Test NO SPAT now! Write for FREE sample.
THE MIDLAND PAINT & VARNISH CO.
3804 EAST 91st ST. • CLEVELAND 5, OHIO

Circle No. 75 on Reader Service Card.

G-E Opens New Plant

General Electric Company recently opened a new welding plant in York, Pa., according to Raymond C. Freeman, department general manager. Headquarters for G-E welding products, the plant will be utilized to manufacture a-c transformer, d-c rectifier, d-c motor-generator and d-c engine welders.

Salkover Metal Processing Moves to Franklin Park

Salkover Metal Processing of Illinois, Inc., has moved to its new plant in Franklin Park, Illinois. The firm is one of the country's largest commercial copper brazing and bright annealing organizations. All company operations are now being concentrated in the new plant.

We mean the seats in oxy-acetylene cutting torches. That's a touchy spot with welders. The point is this: you simply *can't* burn out the seat in Smith's Lifelong, Midline, and Airline cutting assemblies. A built-in patented feature called FLO-TROL eliminates the *cause* of burned-out seats.

Write us today.

SMITH WELDING EQUIPMENT CORPORATION

Dept. IW-151 2633 S. E. 4th St. Minneapolis, Minn.

Circle No. 78 on Reader Service Card.

WHEN YOU BURN OFF GALVANIZING

RE-GALVANIZE with Galvalloy

WILL
- BOND QUICKLY
- BOND PERMANENTLY
- BOND TO MOST METALS
- WITHSTAND 30 DAY SALT TEST

NO
- FLUX
- SANDBLASTING
- CLEANING

WON'T
- PEEL OFF
- BURN OFF
- CHIP OFF

Applying Galvalloy

Pre-Heating

Galvalloy costs you less, because of its higher melting temperature which eliminates loss in application.

METALLOY PRODUCTS CO.
1351 EAST 17TH ST., LOS ANGELES 21

Circle No. 79 on Reader Service Card.

WELDING COPPER

(Continued from Page 49)

a flux-like, continuous, liquid-glass film forms which covers and protects the molten weld metal. The silicon bronze electrode E-Cu-Si is employed along with a fluxing agent that has a high boric acid content. A small weld pool is generally recommended to facilitate rapid solidification and obtain a small grain size and avoid contraction strains during the cooling phase. An oxidizing flame will aid in maintaining the small weld pool.

How to Weld Phosphor Bronzes

Oxy-acetylene welding of the phosphor bronzes is not usually done since both cracking and porosity of weld deposit may occur. However, where it is necessary, it is necessary to minimize the heat zone in order to promote quick solidification. An electrode having about 1½-percent tin should be used with a good fluxing agent. A neutral flame is usually employed. Where lead may be present within the base composition an oxidizing flame is the preferred.

The nickel silver alloys can be

(Please Turn Page)

Circle No. 80 on Reader Service Card.

Here's Efficient, Low-Cost
POSITIONING EQUIPMENT

Model UTLP-15—smallest, lowest cost portable turning roll. Equipped with infinitely variable and reversible speeds, direct worm gear on both sides, anti-friction ball bearings, rubber-tired wheels, on-off switch and 110 volt, single phase motor, 60 cycle AC. Capacity 2" to 6 ft. dia.; weight to 1500 lbs. Speeds from zero to 60 lpm.

Model UP-40—Heavy-duty, gear-driven welding positioner. Capacity of 500 to 6000 lbs. Has constant or variable speed rotation, power or manual tilting up to 135°, reversible. Equipped with elevating sub-base. Speed range: 20 to 1 ratio.

Model UP-3—versatile bench model has telescopic base 27" to 48" in height and swivel tilt to 90°. Capacity 150 lbs. Equipment includes anti-friction ball bearings, infinitely variable speed, on-off foot switch, universal motor-rheostat control. Motor 110 volt, single phase, 60 cycle AC.

"ALL OUR GEAR AND MOTOR MECHANISMS ARE PROTECTED"

• Send for free Catalog No. 54 •

UNIQUE TURNTABLE & EQUIPMENT CORP.
1125 IRVING AVE. • BROOKLYN 27, N. Y.

NEMCO ALL PURPOSE Cast Iron FLUX

Cast Iron Welding and Brazing is easy with this new multi-purpose flux. Quickly tins and deeply penetrates even through rust, scale or dirt. Good for brazing steel and copper. Reduces torch time.

If your dealer cannot supply you, send us his name and address. A FREE SAMPLE will be sent you.

FOR WELDORS WHO WANT THE BEST

NORTHEAST METALS CO.
4124 Torresdale Ave. Phila. 24, Pa.

Circle No. 81 on Reader Service Card.

readily welded provided a liberal application of flux is employed; this fluxing is important since every trace of the refractory nickel oxide must be removed to insure a sound weld. The filler rod usually employed is a high zinc bronze which may contain up to 10-percent nickel. The cupro-nickel alloys, which are higher in nickel content, require a very active flux to eliminate any refractory nickel oxide and be welded with a slight reducing flame. Welding rods are usually of the same composition as the base metal and should include deoxidizers such as either manganese or silicon so as to protect the metal during the welding process. A rapidly solidifying weld deposit is desired which pre-cludes that agitation of the weld pool should be avoided.

The weld once started should be run to the end without stopping and the rod should be maintained continuously in the protective envelope of the flame. Welds having good strength properties and high ductility are obtained.

The aluminum bronzes are very rarely welded by the oxy-acety-

MEETS EVERY STANDARD ACROSS THE WORLD!

The leader for over forty years.
Quality in any quantity.

SHAWINIGAN
PRODUCTS CORPORATION
EMPIRE STATE BLDG. ● NEW YORK 1, N.Y.

Circle No. 82 on Reader Service Card.

do you have a plant DERMATITIS PROBLEM?

If you have, you'll want a copy of this completely indexed, easy-to-use safety reference book. Second printing available for immediate shipment. Order your copy now. Price: $25.

● The Handbook gives immediate answers on what to do about hundreds of safety hazards. Whether you are a veteran or a beginner in safety work, this complete handbook, written in non-technical language, belongs on your shelf.

INDUSTRIAL BOOK CO.
1240 ONTARIO ST. ● CLEVELAND 13, OHIO

lene process due to the difficulties encountered in handling the aluminum oxide film with the conventional fluxes designed for brass. Similar difficulties are experienced in the gas welding of beryllium copper. In this instance, the beryllium copper oxide film cannot be eliminated by the flux compositions available.

Mobile Welding Clinic

Mir-O-Col Alloy Co., Inc. and Pacific Welding Alloys Mfg. Company of Los Angeles, are sponsoring this mobile unit that is being used to demonstrate newest automatic submerged arc welding and hardfacing techniques, as well as a number of the latest welding products marketed by companies. The unit is under the direction of Sid Jordan, shown at the wheel.

Circle No. 83 on Reader Service Card.

Reduce Spot-Welding Rejects With

DICE MICROHM METER MODEL 151

First developed by Dice, this instrument is now widely used in industry to maintain quality control and reduce rejects in the spot-welding of aluminum . . . by checking the surface resistance of sheets to see that they have been properly cleaned. The Dice Model 151-S measures resistances as low as ½ microhm in the low range to 750,000 microhms in the highest range. A low resistance reading indicates that the metal to be welded is properly cleaned. For free bulletin giving detailed information on how the Dice Microhm Meter can help you, write today.

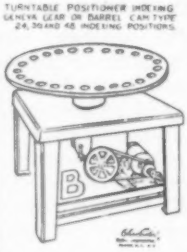
J. W. DICE CO.
Englewood 1, New Jersey
"Non-destructive Testing and Measuring Instruments"

Indexing Turntables, Positioners For Brazing And Welding

Spot Welding Tips Made To Your Specifications. All Types And Sizes

Spot Welders Press Foot Or Air Operated

Wire Butt Welders For Various Alloys And Saw Blade Welders



DR. CHAS. EISLER, M. E., Pres.

EISLER ENGINEERING CO., INC. 735 So. 13th St. Newark 3, N. J.

Circle No. 84 on Reader Service Card.

Circle No. 85 on Reader Service Card.

TOUGHIDE
Arc Welding Cable

EXTRA FLEXIBLE
HIGHEST QUALITY
LOWEST PRICES

#2	$215	#2/0	$388
#1	$256	#3/0	$484
#1/0	$323	#4/0	$603

Cable packed in 250-ft. coils.
Two or more coils shipped prepaid.
Dealer Inquiries Solicited
Write for details.

STAHL EQUIPMENT CO.
94 Washington St.
Brookline Village 46, Mass.

★ ★ ★
WELDERS and METALWORKERS
CLOVER BRAND CRAYONS
SOAPSTONE—TALC
SELECT GRADE—No hard spots or impurities
REGULARS—Long wearing marking edge
THRIFT GRADE—High quality, low price
1227
WHITTAKER CLARK & DANIELS, INC.
260 West Broadway
New York 13, N. Y.

Circle No. 86 on Reader Service Card.

Improved Lighter
Welder's Round File Jumbo Lighters
The "Cadillac" in the Lighter Field
Producing the world's hottest spark, Jumbo lighters have been redesigned to incorporate these important features:
- Largest Flint
- Rust-Proof Frame
- Inner Spring
- Lights in Wind
- Rugged Construction
- Parts Replaceable

List Price $2.00—
Send Your Mail Order Today.
Dealer Inquiries Invited
FLINT PRODUCTS CO.
2925 Avenue H Brooklyn, N. Y.

Circle No. 87 on Reader Service Card.

Southern Metals Conference Held in Atlanta

Diversification in Southern metalworking operations were highlighted at the four-day ninth annual Southern Metals Conference held in Atlanta, Ga. In addition to 7 technical sessions on various aspects of metalworking, the meeting featured a guided tour through various manufacturing plants. The conference was sponsored by the American Society for Metals and was attended by some 150 engineers and metallurgists from leading Southern metalworking centers.

Dow Chemical Opens Magnesium Mill

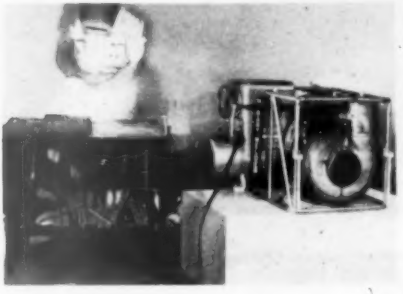
A complete line of magnesium mill products is now being produced at the company's Madison Division in Madison, Illinois. The Madison mill produces tread plate, tooling plate, flat sheet and plate, coils and various extruded shapes.

Marquette Appoints McGrath Sales Engineer

Harold McGrath has been appointed sales engineer for the automotive division of Marquette Manufacturing Co. of Minneapolis. Announcement was made by H. J. Lange, president of the company. McGrath will work with Marquette distributors in Wisconsin, upper Michigan, northwestern Illinois and Iowa in the sale of electric welders, welding rods, oxy-acetylene welding equipment and battery chargers.

Hobart Develops Experimental Turbine-Type Arc Welder

Here's a glimpse of the first arc welder to use a gas turbine as a prime mover. It's a development of Hobart Brothers Scientific Research Division at Troy, Ohio.



Pictured here is a 250 ampere capacity DC Welding Generator that was successfully operated and tested under actual working conditions. It is not a commercial venture, but rather a development with the idea of keeping abreast of the times in a fast changing world of engineering and equipment.

In building this special unit, the company is primarily interested in knowing more about the gas turbine, and the possibilities it might hold for use in building more compact, lighter weight equipment. Greatly reduced weight and size are decided advantages of using the gas turbine that could well be the power of tomorrow.

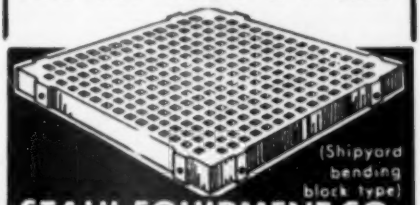
The accompanying illustration is a posed one in that the operator would not weld for any length of time without gloves and other protection for his arms.

SEE PAGE 12 FOR VALUABLE FREE LITERATURE AVAILABLE

Circle No. 88 on Reader Service Card.

WELDING and SET-UP PLATENS

Floor plates — bending tables — layout tables—straightening tables—dog blocks bending blocks—blacksmith blocks. 5'x5' 6'x6' — 6'x8' — 6'x10' — 5'x10' 6'x12'—3'x3'—either 6" or 7" thick.



(Shipyard bending block type)

STAHL EQUIPMENT CO.
94 Washington St.
Brookline Village 46, Mass.

now.... PIERCE / LONG RANGE UNIVERSAL GOVERNOR

fits
9 out of 10 industrial gasoline engines
gives long range speed selection

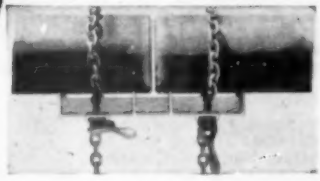
Accurate "variable speed" or "constant speed" between 1600 and 2600 RPM.

Pierce is the most widely used governor for engine-driven welders. See your dealer or write to:

THE PIERCE GOVERNOR CO., INC.
1616 Ohio Avenue • Box 1000 • Anderson, Indiana

Circle No. 89 on Reader Service Card.

JEWEL PIPE CLAMPS



For fast, Accurate Pipe Welding. Sturdy construction for hard usage. Aligns and holds pipe for tacking. Two sizes: ½ to 8" and 8 to 16".

Write for details

JEWEL MANUFACTURING CO.
1841 University Ave. St. Paul 4, Minn.

Circle No. 90 on Reader Service Card.

ADVERTISERS IN THIS ISSUE

A

Acme Manufacturing Co. 2
Acorn Iron & Supply Co. 104
Adjustable Clamp Co. 96
Air Reduction Sales Co. 29
Allied Steel & Tractor Products, Inc..105
Alloy Rods Co. 13
All-State Welding Alloys Co., Inc.... 91
Aluminum Co. of America 66-67
Ampco Metals, Inc. 93
Aronson Machine Co. 26
Atlas Welding Accessories Co. 11

B

H. R. Basford Company 92
Becker Bros. Carbon Co. 96

C

Carlson & Sullivan, Inc. 101
Carborundum Co. 56-57
Chicago Boiler Co. 105
Chicago Eye Shield Co. 40
Chicago Hardware Foundry Co. 93
Cullen-Friestedt Co. 17

D

J. W. Dice Co. 109
Despatch Oven Co. 64
Drawalloy Corp. 32
Duro Engineering Co. Inside Back Cover

E

Eisler Engineering Co. 109
Eutectic Welding Alloys Corp. 80

F

Flint Products Co. 110

G

Gas-Arc Supply 104
General Electric Co. 8-9, 10

H

H & M Pipe Beveling Machine Co....102
Handy & Harman 62
Harris Calorific Co. 15
Haynes Stellite Co. Div. of
Union Carbide & Carbon Corp. 73
Hobart Bros. Co. 1
Hoffman, Robt. W. Co., Inc. 103
Hossfeld Mfg. Co. 97

I

Independent Engineering Co. 74
International Nickel Co., Inc. 79
Invincible Vacuum Cleaner
Manufacturing Co. 20

J

Jackson Products Co..Inside Front Cover
Jewel Mfg. Co. 111

K

Kedman Co. 97

L

Lincoln Electric Co. 39
Linde Air Products Co., Div. of
Union Carbide & Carbon Corp. 99

M

Maitlen & Benson, Inc. 81
Mallory, P. R., & Co. 33
Manhattan Rubber Div. 46
Marquette Mfg. Co. 100
Master Pneumatic Tool Co. 16
Metalloy Products Co. 106
Midland Paint & Varnish Co. 105
Miller Electric Mfg. Co. 21, 105

N

National Cylinder Gas Co. 23
National Welding Equipment Co. ... 52
North American Philips Co., Inc.,
Elmet Div. 7
Northeast Metals Co. 107

O

Ohmstede Machine Works 24

P

Pennsylvania Optical Co. 27
Petersen Mfg. Co. 89
Phoenix Products Co. 14
Pierce Governor Co. 111

R

Ransome Co. 88
Raybestos-Manhattan, Inc. 46
Reid-Avery Co. 18-19

S

Shawinigan Products Corp. 108
Sight Feed Generator Co. 65
A. Smith & Son, Inc. 100
A. O. Smith Corp. 34-35, 50-51
Smith Welding Equipment Co. 106
Stahl Equipment Co. 110, 111
Stoody Co. 45
Stulz-Sickles Co. 101

T

Tempil Corp. 75
Tipaloy, Inc. 28
Titan Metal Mfg. Co. 6
Trindl Products, Ltd. 92

U

Unique Turntable Equipment Corp...107

V

Velocity Power Tool Co. 90
Victor Equipment Co. 4
Vogel Tool & Die Corp. 103

W

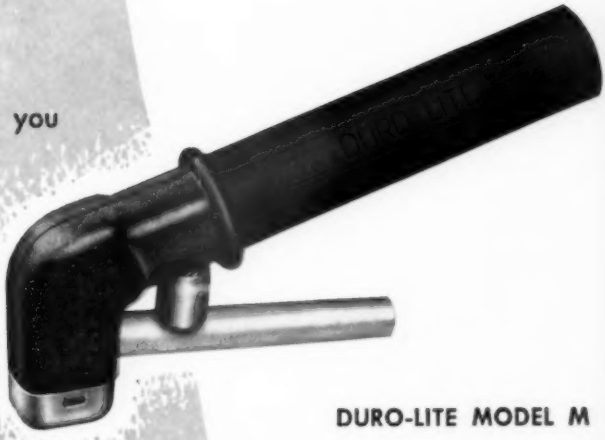
Wagner Mfg. Co. 31
Wall-Colmonoy Corp. 87
Welded Truck & Specialty
Div. of Wallace Tube Co. 104
Weldit, Inc. 3
Whittaker, Clark & Daniels, Inc. 110
Willson Products, Inc. 68
WW Alloys, Inc., Div. of
Fansteel Metallurgical Corp. 25
Worthington Corp. 82

Duro Electrode Holder

The Duro Electrode Holder has served the welding industry since 1932. It is famous for long life, positive grip and perfect balance. All parts are easily renewed. Semi- or fully insulated, this holder is available in 250, 300, 400, 500 and 600 amperes.

Duro - Lite
Electrode Holder

Duro is now pleased to bring you the NEW 16 oz., Duro-lite. Designed for tomorrow, it features fast changes (lever action with no turning), extreme Duro-bility, long life, full insulation and easily replaced parts. Takes up to 300 amperes and has a range from 1/16" to 1/4" rods.



DURO-LITE MODEL M

Write for descriptive folder.

Circle No. 91 on Reader Service Card for more information.

Duro ENGINEERING COMPANY
140 Park Street, New Haven, Conn.

What do *You* think is the reason for these figures?

FIRST 10 MONTHS OF 1954

COMPARISON OF ADVERTISING PAGES

INDUSTRY AND WELDING

711 **Pages of Advertising**

WELDING ENGINEER

544 **Pages of Advertising**

For the first 10 months of 1954 Industry and Welding has already carried 167 more pages of advertising than the second book in the field.

And during 1953 . . .
important national advertisers placed 172 more pages of advertising in Industry and Welding than in the second book in the field.

INDUSTRY & WELDING

1240 Ontario St. **Cleveland 13, Ohio**

Division of Industrial Publishing Co.